DOCUMENT RESUME

ED 431 459 JC 990 381

AUTHOR	Grubb, Norton W.
TITLE	Learning and Earning in the Middle: The Economic Benefits of Sub-Baccalaureate Education.
INSTITUTION	Columbia Univ., New York, NY. Community Coll. Research Center.
PUB DATE	1999-04-00
NOTE	123p.
PUB TYPE	Reports - Descriptive (141)
EDRS PRICE	MF01/PC05 Plus Postage.
DESCRIPTORS	*Associate Degrees; *Community Colleges; *Economic Impact; Employment; Employment Potential; *Outcomes of Education; *Salary Wage Differentials; School Effectiveness; Two Year Colleges

ABSTRACT

This report reviews the available evidence on the economic benefits of postsecondary education below the level of the baccalaureate degree, concentrating on the effects of community colleges. Several new national data sets have become available over the past decade, expanding the number and detail of results available. Effects of sub-baccalaureate attendance are presented in general, for special groups, by field of study, and by types of institutions. In addition, states have begun using Unemployment Insurance data to measure the employment and wage effects of their postsecondary programs. Results are presented for California, Washington, Florida, Texas, and North Carolina. While the state and local analyses available are still limited, the results are similar to those from national studies. In general, the results indicate substantial benefits for many kinds of postsecondary education, particularly when individuals complete programs, enroll in certain occupational areas, and find employment related to their fields of study. The benefits of small amounts of community college remain unclear. Many of the state results indicate that the benefits materialize within three years of leaving education, tough the long-run effects may be even greater. However, under certain conditions, economic benefits fail to materialize, clarifying the value of empirical work rather than ideology or hearsay in helping inform students, educators, and policy makers. Contains over 100 references. (JJL)

Community College

LEARNING AND EARNING IN THE MIDDLE: THE ECONOMIC BENEFITS OF SUB-BACCALAUREATE EDUCATION

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School of Education
University of California, Berkeley

April 1999

Research Center

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This report reviews the available evidence on the economic benefits of postsecondary education below the level of the baccalaureate degree, concentrating on the effects of community colleges. Several new national data sets have become available over the past decade, expanding the number and detail of results available. In addition, states have begun using Unemployment Insurance data to measure the employment and wage effects of their postsecondary programs. While the state and local analyses available are still limited, the results are quite similar to those from national studies, and they can be (and will increasingly be) used for purposes different from national studies. In general, the results indicate substantial benefits for many kinds of postsecondary education, particularly when individuals complete programs, enroll in certain occupational areas, and find employment related to their fields of study. However, under certain conditions, economic benefits fail to materialize, clarifying the value of empirical work rather than ideology or hearsay in helping inform students, educators, and policy-makers.

ACKNOWLEDGEMENTS

Walter Masuda and Kristine Latronica provided excellent research assistance in finding materials. A number of researchers provided additional data and discussion about their studies including Brian Surette, Francisco Rivera-Batiz, Joanne Spetz, and Darrell Lewis. Several state and local researchers were particularly helpful in providing information for Section II, especially Loretta Seppanen, Mark Anderberg, Frankie Laanan, Jorge Sanchez, Keith Brown, Randall Hickman, and Darlene Briggs. Participants at seminars held by the Community College Research Center and the Social Science Research Council made helpful comments on earlier drafts, as did Marc Anderberg, Tom Bailey, David Boesel, Kevin Hollenbeck, Loretta Seppanen, and several anonymous referees. As usual, I alone am responsible for interpretations, errors of omission and commission, and lapses in judgement.

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rather than continuing to rely on ideology, myth, outmoded data, or the personal stories that sometimes pass for truth among students and policy-makers alike.

I. THE ISSUES IN SUB-BACCALAUREATE EDUCATION

Sub-baccalaureate education has been growing substantially. As the figures in Table 1 reveal, thirty years ago only 13 percent of the labor force had "some college;" currently, however, as part of the upward trend in education, about 27 percent of the labor force have more than a high school diploma but less than a baccalaureate degree. Forecasts of the nation's occupations suggest that this trend will continue: The occupations with the highest growth rates include health technicians; technicians and related support occupations; marketing and sales occupations; and some administrative support occupations, including computer operators—all of which typically require some education beyond high school but less than a baccalaureate degree (Silvestri, 1993, Tables 1 and 2).[iii] Many of the recent commission reports concerned with the state of education in the United States have repeated this convention: for example, *America's Choice: High Skills or Low Wages!* stated that

> more than 70 percent of the jobs in America will not require a [four-year] college education by the year 2000. These jobs are the backbone of our economy, and the productivity of our workers in these jobs will make or break our economic future.

Even if occupational forecasting is a risky business, the educational level of the labor force is almost certain to continue increasing—and much of the growth will take place at the sub-baccalaureate level.

During this period of increase, the simple economic benefits of sub-baccalaureate education—as measured by the ratio of earnings to those of high school graduates—increased somewhat. During the 1960s, those with some college earned a little less than high school graduates. Currently those with some college earn 14 percent more among men and 17 percent more among women, suggesting that relative demand for sub-baccalaureate education has increased over the past three decades.

However, the figures for those with "some college" lump together a heterogeneous group of individuals. Some have completed credentials, particularly two-year Associate degrees and one-year certificates; smaller numbers have received occupational licenses of various kinds. Many have entered two- and four-year colleges and then left, with amounts of postsecondary education ranging from a course or two to nearly a baccalaureate degree. Because both the quality and the quantity of postsecondary education vary so much among those with "some college," it is critical to disaggregate this group. Unfortunately, there is no unambiguous way to do so, and each data set provides slightly different kinds of information. Overall, non-completion from both two- and four-year colleges has increased since the mid-1970s (Grubb, 1989b; Boesel & Fredland, 1998, Figure 3). Rates of dropping out are particularly high from community colleges and less selective four-year colleges, and among low-income and minority students. For example, of students entering public two-year colleges in 1989-90, 12.9 percent obtained a certificate by spring 1994, 17.5 percent an Associate degree, 6.5 percent a baccalaureate degree; 48.6 percent were not enrolled and had earned no degree, while 14.7 percent were still enrolled (Berkner, Cuccaro-Alamin, & McCormick, 1996, Table 2.1b). Therefore it is particularly important to determine the economic consequences of leaving postsecondary institutions without credentials.

The high levels of non-completion in community colleges have generated different interpretations. One is that non-completion reflects some way in which the college has failed to meet the educational needs of a student—though in the case of community colleges external pressures (like the lack of financial support, the demands of employment and family life) are surely responsible for a great deal of dropping out. Advocates of community colleges often insist that students leave when they have completed enough coursework to advance in their jobs, or to qualify for an improved job; in this view, what appear to be dropouts are really

completers who have finished just enough coursework for their purposes. For example, Texas developed the concept of the "marketable achiever" when it found many older students who left after a year because employers were hiring the best of the first-year class. In addition, some of these "dropouts" may have passed licensing exams necessary for occupations ranging from aircraft mechanic to cosmetology. Over the past decade credentials offered by private groups—industry associations like the American Welding Society or the National Automotive Technicians Education Foundation (NATEF), and individual firms like Microsoft and Novell—have proliferated,[iv] and students earning such "private" credentials may appear to be dropouts because they have not completed publicly recognized credentials. A different perspective is that of Manski (1989), who notes that the community college is a low-cost way of finding out about postsecondary education; these "experimenters" may drop out if they find college not to their advantage. This perspective also indicates that many students in postsecondary education—and certainly many non-traditional and older students attending community colleges—are not the well-informed consumers often assumed in state and federal policy, but are searching for information through the very process of attending college. There are, then, several ways to understand non-completion, and many potential benefits of short periods in postsecondary education, but the reasons for non-completion are complex and difficult to disentangle.

Another complication is that the types of institutions providing sub-baccalaureate education vary substantially. Four-year colleges and two-year community colleges are well known, of course, though their quality varies in ways that are understood (incompletely) only for four-year colleges. Some states have two-year technical institutes (or technical colleges) that offer credentials in occupational subjects only, though enrollments in these institutions are relatively low and probably declining.[v] Many area vocational schools provide short

programs and sometimes certificates for adults. Finally, a variety of proprietary schools offer postsecondary occupational education, ranging from the excellent—in well-known institutions like the Culinary Institute of America and the various DeVry Institutes—to the fraudulent. Unfortunately, few data sources are able to disentangle the different types of postsecondary institutions. When researchers are forced to lump postsecondary institutions together, it is important to remember that the variations in quality that might lead to higher and lower economic benefits are simply averaged, describing an overall effect that is not especially meaningful for any particular institution.

On the demand side, there appear to be several special characteristics of the sub-baccalaureate labor market that distinguish it from the market for those with baccalaureate and graduate degrees—though these should be treated as hypotheses meriting further examination.[vi]

• The sub-baccalaureate labor market appears to be quite local. Employers looking for occupations requiring less than a baccalaureate degree report that they search locally; their relationships with educational providers tend to be local. Two-year colleges target local employers as well, and students search for employment almost entirely with the local community. One implication is that the benefits of sub-baccalaureate education may be geographically circumscribed since the reputation of community colleges and other institutions may be spatially limited. Under these conditions, it is important for institutions to be closely connected with local employers: if individuals fail to find local employment in their field of study, they may have a harder time in other areas.

• Hiring practices for sub-baccalaureate jobs tend to be highly informal, with few performance-oriented tests or absolute education requirements. As a result, employers may hire on the basis of several equivalent qualifications. Specific experience is usually preferred to formal schooling, and preparation in the military, on the job, and through hobbies may be as valuable as formal

schooling. In contrast, education is more likely to be an absolute prerequisite for professional and technical jobs at the baccalaureate level. For example, only 36 percent of those with some college report that they needed formal schooling to get their current job, compared with 72 percent of those with baccalaureate degrees (Eck, 1993, Table 6). Under these conditions, the returns to formal schooling are likely to be lower and more uncertain, since those with certificates and Associate degrees may be working alongside individuals with lower levels of formal schooling and other forms of occupational preparation.

• The jobs held by individuals with sub-baccalaureate education appear to be more cyclically sensitive than those held by individuals with baccalaureate degrees, since employers are likely to lay off less-educated workers before well-educated employees with more general *and* firm-specific training. One consequence is that individuals with sub-baccalaureate education are more likely than those with baccalaureate degrees (though less likely than high school graduates) to suffer unemployment over the business cycle. In turn, this implies that the economic returns to formal schooling measured by annual earnings might vary cyclically, with returns higher in periods of high unemployment when more formal schooling enhances employment as well as wage rates.

Finally, in determining the value of education, there are several well-known statistical problems in examining wages, earnings, and other employment effects. Because postsecondary institutions differ substantially in their quality and selectivity, students vary in their high school grades and other academic qualifications, their family backgrounds, their purposes and ambitions; those entering occupational programs differ from those enrolling in academic programs for the purpose of transferring to four-year colleges. Similarly, measures of ability have long been recognized as critical to disentangling the direct effects of formal schooling from effects of ability. Of course, researchers are restricted by the measures of academic achievement, family background, and ability included in

national data sets—though they have included as many measures of these characteristics as data permit. Unfortunately, the state data sets using UI wages often lack such measures, even when they might be available from institutional records.

In addition to potentially observable factors like academic achievement, family background, and ability, other analysts have tried to control for *self-*selection into various institutions, as individuals select the institutions that might be best for them. Self-selection may be a particularly important aspect of sub-baccalaureate education because of some evidence that community college students choose these institutions (rather than four-year colleges) when they are unsure of their abilities and interests, when they are unsure of their ability to make their way in large and impersonal institutions like public four-year universities, and when they feel unable to leave home.[vii] As a result of self-selection, some observers have argued that most students attending two-year colleges would not attend postsecondary education at all if community colleges were not so accessible. This issue is in turn related to a conceptual argument and to important decisions about statistical analysis. If community college students would otherwise have attended four-year colleges where they are more likely to complete baccalaureate degrees, then community colleges operate to "cool out" their aspirations, reducing their eventual education attainment (Clark, 1960, 1980; Karabel, 1972; Zwerling, 1976; Pincus, 1980; Brint & Karabel, 1989). If, on the other hand, students entering community colleges would otherwise not have progressed beyond high school, then the expansion of two-year colleges since the 1960s provides enhanced educational opportunities, particularly for moderate-income, minority, and other "non-traditional" students. A number of researchers have compared students with postsecondary education in two-year versus four-year colleges, implicitly assuming that the alternative for those attending community colleges would have been to attend four-year colleges. But if four-

year college is not a possibility, then the relevant comparison is between the effects of a high school diploma and those of various amounts of community college education. In the results reported in Sections II, I take the latter approach, comparing the wages and earnings of individuals with varying kinds of postsecondary education to those of high school graduates.[viii]

A final problem is that the benefits of postsecondary education may not materialize until individuals reach their late twenties or early thirties. In conventional age-earnings profiles by levels of education, earnings for different education groups do not begin to diverge until after age 30. One implication is examining wages and earnings soon after leaving postsecondary education may not capture the differentials related to education that emerge only as individuals advance in the early stages of their careers (see Klerman & Karoly, 1994 on movement into "adult" employment). This is a special problem with national data sets based on young cohorts, and with state data that collects information shortly after leaving postsecondary education.

In sum, the particular institutions that provide sub-baccalaureate education, the nature of students who enroll in these institutions, the special characteristics of demand generate a series of hypotheses worth investigating, though certain well-known statistical issues create problems in doing so. As we will see in the next sections, many data sets are not rich enough to test some of these hypotheses and others have not been investigated even when the data are available. These issues illustrate the complexity of sub-baccalaureate education, along with its potential importance for students and employers alike.

II. NATIONAL STUDIES ON THE EFFECTS OF SUB-BACCALAUREATE EDUCATION

In this section I review the effects of sub-baccalaureate education on wages, annual earnings, and other measures of employment, based on several national data sets. These results are generally derived from so-called Mincerian rates of return (as distinguished from internal rates of return), in which the log of wages or earnings is regressed against education, experience, and other variables including family background, ability, race and ethnicity, gender, sometimes regional variables to capture differences in prevailing wages among regions, union membership, and other measures:

(1) $\ln Y = a + b\,Ed + c\,Exp + d\,Exp^2 + \ldots + u$

where u is an error term. The coefficient b is commonly referred to as a rate of return; when education is measured by a series of dummy variables rather than a continuous variable, the coefficient b is *approximately* equal to the percent increase in wages (or earnings) associated with a change in education.[ix] The research described in this section relies on dummy variables describing schooling rather than continuous variables and the comparison is always to high school education.

Before the appearance of recent data sets, most national data reported education in discrete categories including high school completed, "some college," and completion of college. However, data on "some college" could not be used to disentangle the effects of completing credentials from different amounts of coursework, or education in various fields of study or in different institutions.

The early results about sub-baccalaureate education were generally drawn from special-purpose data, usually based on individuals in specific institutions and collected by following up students with questionnaires, often affected by low response rates. For example, Heinemann and Sussna (1977) analyzed students in a single Midwestern community college; they found an advantage in earnings for completers compared to non-completers, particularly high for non-whites, but it vanished after 8 years for white males. Blair, Finn, and Stevenson (1981)

investigated the effects of schooling among technical and scientific employees, based on National Science Foundation data; technical employees with Associate degrees had higher earnings—on the average about 9.4 percent higher—than those with high school diplomas, while those with 1-3 years of college without a credential earned 5 to 6.2 percent more.

In a widely cited review, Pincus (1980) amassed a number of local studies of community colleges. Apart from problems like low response rates, he tended to compare the employment effects of community colleges with those of completing four-year colleges. Brint and Karabel (1989) similarly rejected the "vocationalizing project" of the community colleges for limiting rather than expanding opportunities for students; but they too relied on articles with serious technical flaws[x] and stressed that the economic benefits from community college are lower than those from four-year colleges—hardly a surprising conclusion, but relevant only if community college students would otherwise enroll in and complete four-year colleges.

Beginning in the 1970s, several national data sets became available with greater detail about education. For example, Monk-Turner (1983) relied on the Parnes data, a sample of young men between 1966 and 1976 and of young women between 1968 and 1977. Entering a four-year college increased occupational status scores compared to entering a two-year college, for men only, though she failed to distinguish entrance from completion. Relying again on the Parnes data, Monk-Turner (1990) found that entering a four-year college (rather than a community college) and completing a baccalaureate degree (rather than entering and failing to complete) increased occupational status scores. This kind of comparison between two- and four-year college enrollment has continued (e.g., Whitaker & Pascarella, 1994). Breneman and Nelson (1981) was one of the first analyses of NLS72, a survey of a random sample of students from the high school class of 1972 who were followed four times until 1979 and then again in 1986. They found no effect of community college attendance on 1976 wages (failing to distinguish completion from non-completion). However, this study suffered from the problem of measuring results very early in the sample's work lives, when individuals were only four years out of high school (about 22 years old).[xi]

The early negative results were then widely cited by the critics of community colleges: Brint and Karabel (1989) relied heavily on the studies by Wilms (1974), Breneman and Nelson (1991), and Monk-Turner (1990) as well as the summary by Pincus, as did Dougherty (1987); Pincus (1986) relied on his earlier summary of institutional studies as well as those by Breneman and Nelson and by Wilms. In this way the negative results were restated over and over without questioning their robustness. Unfortunately, many of these relied on limited data of uncertain generalizability, were poorly controlled, and failed to distinguish carefully among high school graduates, completers of different types of postsecondary programs, and non-completers, and most of them compared attendance at community colleges to four-year colleges. These results therefore tell us little about whether community college attendance and completion enhance employment and earnings over those of high school graduates.

The Recent Studies: Overall Results

Recently several data sets have become available that have improved the ability of researchers to examine the sub-baccalaureate labor market. These include three longitudinal data sets: the National Longitudinal Survey of the Class of 1972 (NLS72); the High School and Beyond Study of the classes of 1980 and 1982, and the National Longitudinal Survey of Youth (NLS-Y), which followed a group of individuals who would have graduated from high school between 1976 and 1983. The Survey of Income and Program Participation (SIPP) has the advantage over these data sets of describing the entire population, rather than a single cohort or a young sample, and has been carried out every year since 1984; however, it is limited as a longitudinal survey since each group of respondents is followed for only 28 or 32 months. The National Survey of Adult Literacy (NALS) interviewed a random sample of the population in 1992; while its major purposes were to ascertain literacy practices and measure levels of literacy using the three scales mentioned above (verbal, mathematical, and document literacy), it also collected data on employment. Finally, the Current Population Survey added a question about certificates and Associate degrees in 1992, allowing for some

detail within the group having "some college;" this data set is extremely restricted in the variables available.

Tables 2, 3, 4, and 5 summarize the effects of earning baccalaureate degree, Associate degree, certificates, and various amounts of postsecondary education without credentials. The coefficients presented in these tables correspond to the coefficient b in equation (1), with the other independent variables included listed at the bottom of Table 2. The omitted category of schooling is high school education, so these results describe the effects of postsecondary education compared to earning a high school diploma only.

Table 2 presents the effects of baccalaureate degrees only for those studies that also include information about sub-baccalaureate education. (For fuller reviews of baccalaureate education, see Leslie & Brinkman, 1988; Pascarella & Terenzini, 1991, Ch. 11; and Boesel & Fredland, 1998.) Even these limited results indicate how much variation there can be in the estimated returns to schooling, even for something as basic and apparently well understood as the value of a baccalaureate degree. In these results, the returns are generally lower for the transcript-reported results from the NLS72 data than for self-reported results, as expected;[xii] the results are especially high for the CPS data, for which few independent variables are available. Most of these parameters are in the range of .20 to .40 for men, and are somewhat higher for women, in the range of .30 to .40. They are generally higher for earnings than for wage rates, indicating that completing a baccalaureate affects the amount of employment in addition to the wage rate.

The results for the effects of Associate degrees, in Table 3, reveal that most analyses find a significant return to this credential.[xiii] In general, the coefficient hovers in the range of .20 to .30. Comparing the results for specific studies, the return to a baccalaureate degree is always about .10 to .20 higher than the return to an Associate degree. Again, the returns are usually slightly higher for women than men, and they are higher for earnings than for wages. With some exceptions, then, these results clarify that completing Associate degrees generally enhance wages, employment, and earnings by significant amounts, in both statistical and conventional senses. For example, my SIPP results, close to the

middle of the range of estimates, indicate that men with Associates degrees earn 18 percent more, and women 23 percent more, than high school graduates, once all the other differences between the two education groups have been considered.

Unfortunately, there are relatively few data sets that include information about certificate programs—which are generally one-year programs focusing on occupational preparation without much of the academic and general education content of an Associate degree. As reflected in Table 4, the NLS72 and the NALS data suggest a zero return to a certificate for both men and women. The SIPP data indicate significant returns, though they appear to be declining for men (see Grubb, 1997, for the estimates for 1984, 1987, and 1990) while they are steady for women and tend to be slightly lower than the return to an Associate degree. Surette found a significant effect for completing vocational training among men, though this might not be the same as completing a certificate. The certificate is a common credential in proprietary schools and area vocational schools in particular, and it would be desirable to have better information about it.

Unfortunately, the results on certificates are likely to be flawed by a lack of information about the credentials that may matter most. While the certificate is a state-recognized credential in most states, there are also licenses in many occupational areas—in all health occupations, cosmetology, certain trades, and other occupations like aircraft mechanics where health and safety are critical—as well as the "private" credentials mentioned in Section I provided by trade associations and individual firms. If community college students enroll long enough to earn such credentials or licenses and then leave for employment, the credentials will go unrecorded in results like those in Table 4, and they will show up in national data as non-completers (see Table 5). Given the apparent increase in these credentials, this is a potentially important problem with current results.

The results in Table 5 describe the benefits to individuals who have completed some college but have earned no credential. These results are quite varied, partly because different analysts have specified "some college" in different ways, and partly because different data sets provide varying amounts of information. Clearly, small amounts of postsecondary education do benefit some individuals, particularly in the NLS-Youth results and in the SIPP and NLS72,

results principally for men. But these benefits are quite small, usually in the range of .05 to .10 even in the poorly-controlled CPS results (which include certificate-holders among those with some college); only in the NLS-Youth results does one find coefficients as high as .13, and .20 in one case only. Furthermore, my NLS72 results suggest that benefits are higher for vocational coursework than academic coursework,[xiv] and I suspect that evidence about fields of study and purpose would reveal that some coursework—in high-paying fields of study, for some of the well-paid trades for men, and for those individuals who know exactly what they are doing—have substantial returns while other casual course-taking does not. Furthermore, the licenses and "private" credentials mentioned above would probably affect these results by distinguishing individuals who had earned such credentials—and might benefit substantially in employment—from those who are truly non-completers. These results are, therefore, consistent with the conclusion that individuals *may* benefit from small amounts of postsecondary education, but the benefits are substantially lower than Associate degrees and probably depend on precisely what an individual takes.

One important issue is whether very small numbers of credits—the credits that might be accumulated by students who attend casually, for two or three courses—have any benefit. From Kane and Rouse's NLS72 results as well as most of the NLS-Youth findings, 30 credits—approximately one year's worth of full-time enrollment—increase wages and earnings by 5 percent to a high of 11.3 percent for men and 11.8 percent for women in Surette's (1999) research; the returns are higher for credits from two-year colleges than from four-year schools. However, many community college students never receive as many as 30 credits. Colleges often identify 12 credits as a critical amount, with students earning less than 12 considered "uncommitted" or perhaps "experimenters." The benefits of 12 credits in community college range from zero or insignificant, particularly for those earning academic credits, to 1.6 percent for men with vocational credits (in my NLS72 results), to 2.3 percent (men) and 2.7 percent (women) in Kane and Rouse's NLS72 results, to a high of 4.7 percent for men and 4.8 percent for women in the NLS-Youth results of Surette (1999). I conclude, therefore, that while a year of community college credits may increase earnings by about 5 to 11

percent, the benefits of 12 credits or less are generally not high enough—generally less than 5 percent—to be of any real importance, and are often zero. However, it is important to remember that these estimates are still averages, and other sources of variation—particularly fields of study, relation to employment, and receipt of licenses and "private" credentials—could affect them substantially.

A further question is whether credentials have a value apart from the amount of schooling they require—whether, for example, an individual with the equivalent of two years in a community college (or 60 credits) benefits as much as an individual with an Associate degree. Most analysts tend to call these "sheepskin effects," as if there were something irrational about the effect of the credential or "sheepskin." (See Rawlins & Ulman, 1974, for a review of various conceptions of credentialing.) However, I prefer to call the effects of credentials "program effects," since most certificate and Associate degree programs require a coherent sequence of job-specific courses of increasing difficulty, related academic coursework (or, for academic degrees, a progression of subjects in a specific discipline), plus a program of general education for Associate and baccalaureate degrees. These are, therefore, coherent programs of courses, whereas students taking courses without receiving a credential are more likely to be "milling around" and taking a series of unrelated courses that could not possibly provide substantial preparation for any particular occupation (Grubb, 1989b).

In general most analysts have found positive program effects. For example, Surette (1997) found that the additional effect of completing vocational training above and beyond the credits required was .05, of completing an Associate degree was .083 above the value of two years' credits, and of completing a baccalaureate degree was .24 above the value of four years' credits, with all these effects statistically significant. Surette (1999), using the same data set, estimated the marginal effects of completing credentials to be quite similar: for Associate degrees they were they were .070 and .092 for men and women respectively, and for baccalaureate degrees they were .247 and .236. Kane and Rouse (1995b) found support for sheepskin or program effects for the baccalaureate for men and the Associate degree for women—though the latter

effect may be due to the special benefits of nursing programs, for which completion leads to substantial benefits. In my SIPP results, the return to a B.A. for men in 1990 is .437, compared to .327 for those reporting four years of college without a credential; the return to an Associate degree is .166, compared to .069 for those with two years of college. For women the differences are smaller though still positive; they are larger (and statistically significant) in 1987.[xv] Within the limits of self-reported information,[xvi] then, there do appear to be "program effects" associated with completing postsecondary credentials.

Overall, then, there are clear and substantial returns to Associate degrees, though they are—as anyone would expect—lower than the returns to baccalaureate degrees. There is greater uncertainty about the benefits of certificates, perhaps because of missing information about licenses and "private" credentials. The benefits to completing some coursework in either two- or four-year colleges are smaller, in the range of 5 to 10 percent, and students need to complete one or two years of coursework to derive this benefit; for students at community colleges who are "uncommitted," or "experimenters," the employment benefits are trivial. Consistently, women have higher returns than do men, and returns are higher for earnings than for wages. There appear to be benefits from completing credentials, effects that can be variously described as "program" or "sheepskin" effects. Roughly, then these results are consistent with the naive human capital model in the sense that more formal schooling is better than less: a baccalaureate degree is superior to an Associate degree, which in turn is better than taking some coursework without completing credentials.

The Effects for Special Groups: Minority, Displaced, and Older Students

Given their low costs, lack of admissions requirements, and their claims to being "people's colleges," community colleges have become the postsecondary institutions used to gain access to employment for certain disadvantaged groups. A reasonable question, then, is whether the economic benefits to these groups are substantial, or whether they are lower than they are for non-disadvantaged groups.

A disproportionate number of black and Hispanic students enroll in postsecondary education through community colleges. Relatively few national

analyses have distinguished these groups; however, Averett and D'Allesandro (forthcoming) have distinguished black and white students using the NLS-Youth data. Their results indicate few statistically significant differences between blacks and whites, though this may be due to problems with sample sizes. However, a relatively consistent pattern emerges: the returns to baccalaureate degrees are generally higher for black men and women compared to whites (Table 2), as are the returns to Associate degrees (Table 3). Most comparisons for those not completing credentials (Table 5) favor blacks, and the consistency of the effects perhaps compensates for the lack of statistical significance. Based on these few results, therefore, we can conclude that attending a community college probably confers greater advantages to blacks than to whites, compared to remaining a high school graduate, even though some of the differences are small and uncertain.

However, given such findings, it is important to remember that completion rates are lower for black and Hispanic students compared to whites, and therefore they are less likely to complete the well-paid Associate degree—or to transfer to four-year colleges—once they have entered community college. In Averett and D'Allesandro's results, for example, blacks entering community colleges are much less likely to complete baccalaureate degrees and slightly less likely to complete Associate degrees than are whites—and therefore the slightly higher returns for blacks are undermined by lower completion rates.

Another group in community colleges of particular interest includes older students who return to college in order to upgrade their employment, or to change their occupations when the sector they are in collapses. In addition, the pressure to move individuals off welfare have led to some older welfare recipients in community colleges, sometimes in regular programs and sometimes in programs specially devised for them. The obvious question is whether the employment effects of sub-baccalaureate education, and particularly community colleges, is the same for older individuals and displaced workers as it is for younger students of conventional college age.

Jacobson, LaLonde, and Sullivan (1997) examined the effects of community college programs for displaced workers using unemployment insurance wage data, with samples of Pittsburgh workers in the early 1980s and

Washington State workers in the early 1990s. Not surprisingly, these individuals suffered an earnings decline prior to entering these programs, and they continue to suffer an earnings loss compared to comparison groups[xvii] between $146 and $293 per credit, a substantial amount given that those enrolled completed 26 to 30 credits. Thereafter earnings increased steadily, though the long-run increases in earnings were only 1.5 percent in the Pittsburgh sample and 5 percent in the Washington sample, considerably lower than the returns to about one year or 30 credits in Table 5. However, this overall effect masked substantial differences among fields of study, with substantial positive returns to health-related credits, science and math (in the Pittsburgh sample) and trades and repair (in the Washington sample), while basic or remedial education and the humanities had negative effects. If, for example, an individual took one year's worth of health-related and technical credits in Washington, the long-run increase in earnings would be about 15 percent—close to the effects found by Surette for the NLSY data (Table 5). The results confirm the importance of establishing programs in particular fields of study.

Leigh and Gill (1997) raised the same questions, using NLS-Youth data results up to the 1993 survey when individuals were age 28 to 35. They distinguish "continuing" from "adult" students 25 years old or over, who were 31 percent of those with Associate degrees, 35 percent of those with some community college but no degree, and almost 37 percent of those attending technical institutes. Receiving a degree at age 25 or over made no significant difference to the returns to sub-baccalaureate education for women (though it increased the value of a B.A. from 46 percent to 73 percent). The value of attending a community college without receiving a credential was higher for older men than for younger men, suggesting that older men are more likely to enroll for specific employment-related purposes. Effects for those earning Associate degrees were insignificant, and were negative for those with baccalaureate degrees.

In addition, I carried out a similar test with the SIPP data (Grubb, 1995d, Table 4). Those receiving credentials after age 30 did not have statistically different returns than did those earning credentials between age 24 and 30—and

for women, "late" Associate and baccalaureate degrees have significantly higher returns. Overall, these results indicate that returns to sub-baccalaureate education do not decline for older students and are actually higher for some groups—though there is not any consensus about precisely which older groups benefit most from formal schooling.

The Effects of Credentials by Fields of Study

As is well known, the returns to the baccalaureate degree vary by field of study (Leslie & Brinkman, 1988; Rumberger & Thomas, 1993; Grubb 1992b; 1995c), with engineering, business, math and science having the highest returns while the humanities and education have the lowest returns. It is reasonable to expect parallel differences in the returns to sub-baccalaureate education. To my knowledge, I have been the only one to examine this issue, with both the NLS72 data (Grubb, 1995d) and with the SIPP data as well (Grubb, 1997). In the NLS72 results, returns are particularly high for Associate degrees in health occupations, in technical fields for men, and in "other" fields (like communications and design) among women; the returns are negative though insignificant for agriculture, marketing (i.e., retail sales), and education for men.

For the SIPP data, Table 6 presents the returns to certificates, Associate degrees, and (for comparative purposes) baccalaureate degree by field of study.[xviii] Despite problems with small samples in certain occupational areas, some clear patterns emerge. The modest return to vocational certificates for men in 1987 of about .146 averages higher returns to engineering, computer, and health-related certificates with much lower returns for business and miscellaneous vocational subjects. Similarly, the insignificant coefficient of .063 for 1990 (Table 4) appears to be an average of higher returns for business and engineering/computers, balanced by lower and possibly negative returns in other fields. For women, health-related certificates have significant returns but other fields do not, including the relatively common fields of business and vocational/technical subjects. At this level, "business" programs are often preparing secretaries and data-entry clerks, so it is not surprising to find low returns.

The effects of Associate degrees are somewhat clearer because sample sizes are larger. For men, the returns to Associate degrees are highest in engineering and computer fields; public service[xix] and vocational/technical fields have significant returns in 1987 but not 1990, while business is significant in 1990 but not 1987.[xx] For women, business and health-related occupations have positive returns, while others do not; in vocational/ technical fields (which include low-paid cosmetology programs) and in education (largely child care) the coefficients are negative though insignificant. Evidently, because of the substantial gender segregation at this level of the labor market, the results are substantially different for men and women except in business. Therefore efforts to move women into non-traditional occupations need not only to persuade women to enroll in the appropriate educational programs, but must also change the employment patterns that deny women returns equivalent to those of men.

For Associate degrees in academic subjects, the coefficients are generally insignificant or small, except for women in the "other" category[xxi] in 1987. (In 1990 results, math for men and humanities and social science for women are significant.) This finding suggests that the academic Associate degree, which was historically the path for transferring to four-year colleges, is not necessarily a good investment for those who fail to transfer.[xxii]

The results for baccalaureate degrees replicate familiar results: the highest returns are in business, engineering/computers, health, and math/science; returns are lower in social sciences (at least for men) and the humanities, and lower still in education. These results are more consistent between men and women than are the results for Associate degrees—perhaps a reflection that patterns of gender segregation are more powerful in sub-baccalaureate occupations than they are in occupations for which a baccalaureate degree is common.[xxiii]

Finally, the returns to Associate degrees and to baccalaureate degrees overlap. For example, men can earn more by getting an Associate degree in engineering, public service, or vocational/technical subjects than they can from a baccalaureate in the humanities or education; women can earn more with an Associate degree in business or health than with a baccalaureate in vocational/technical subjects, the humanities, or education. This overlap underlies

the recent phenomenon of "reverse transfer," where students who already have baccalaureate degrees have been returning to community colleges for vocational programs—presumably those with baccalaureate degrees in low-paying fields like the humanities returning for credentials in well-paid health and technical fields. However, it is important to realize that such claims depend on the *overlap* in the distribution of benefits, while on *average* baccalaureate degrees are still more valuable than Associate degrees (as a comparison of Tables 2 and 3 clarifies).

Evidently, at the sub-baccalaureate level as in baccalaureate programs, it matters a great deal what field of study an individual chooses. Of course, there are many possible reasons why students enroll in programs with low returns. For some, non-economic benefits may be important; others may want to go into areas like child care or home health care for personal and altruistic reasons, or may view these as appropriate careers in early stages of their work life. In addition, it is unclear whether students are well informed about these patterns, so that they can make well-informed choices among the occupational alternatives. Given numerous complaints about the lack of guidance and counseling in both high schools and community colleges,[xxiv] it seems likely that some students are making poorly informed choices and entering programs where the economic returns are insubstantial.

The Effects of Finding Related Employment

For vocational and professional programs, which are relatively job-specific, the economic benefits of postsecondary education may depend on whether an individual finds employment related to his or her education. The effects summarized in Tables 2-4 may represent averages of higher returns for those who have found related employment with lower (and even zero) returns for those with unrelated employment. For example, Rumberger and Daymont (1984) found greater benefits to high school vocational programs when students found related employment, but not when their employment failed to use their education.

The only national study of related and unrelated employment is my analysis of the SIPP data (Grubb, 1997). Disentangling the effects of related and unrelated employment requires a definition of which occupations are matched to

particular fields of study. I used a relatively simple matching procedure linking the 19 fields of study in the SIPP data with Census occupation codes.[xxv] Because there are relatively few broad fields of study, this method should if anything err on the side of over-relatedness, or deciding that a program of study and an individual's occupation are related when in fact they are not.

Table 7 presents information about the extent of related and unrelated employment. For individuals with baccalaureate degrees, roughly 60 percent of individuals in occupational areas have related employment. For those with Associate degrees, the proportion of related employment is lower than 60 percent for men but higher for women; this proves to be due to especially high rates of related employment in business and in health occupations, which tend to be dominated by women. The extent of relatedness among individuals with certificates hovers around 55 percent. Among individuals with some college but without a credential, the patterns for men suggest that those with more years of postsecondary education are also more likely to find related employment, while the patterns for women are erratic. Overall, individuals with credentials have higher rates of related employment than those with small amounts of college—and so part of the higher economic benefits of completing coherent programs is due to the advantage that provides in finding employment related to one's field of study. However, it remains unclear whether these figures are "high" or "low," since there is no obvious benchmark to establish what appropriate levels might be.[xxvi]

Tables 8 and 9 present the effects of postsecondary education on annual earnings, differentiated by whether an individual had employment related to his or her field of study, unrelated employment, or an academic field of study for which there was no attempt to match employment.[xxvii] Consistently, the returns to related employment are higher than the returns to unrelated employment, confirming the hypothesis that the job-specific nature of vocational education reduces its value in unrelated jobs. In a few cases—the baccalaureate, and the Associate degree for men—the value of even an unrelated degree is positive and significant (even though substantially lower than the value of a related degree), implying that these occupational degrees have some general components that enhance productivity

and earnings even in occupations unrelated to the field of the credential. However, in the majority of cases, and particularly for women, the coefficient for related employment is significant, but that for unrelated employment is not.

From these results, the best course for a student is to complete an occupational credential and find related employment. An academic degree is second best—both at the baccalaureate level and the Associate level, where the returns to academic Associate degrees are substantial but less than those to related occupational credentials. And the least beneficial course is to complete an occupational degree but then fail to find related employment. These patterns are roughly the same for individuals with postsecondary education who fail to complete credentials: related postsecondary schooling provides some advantages, but unrelated schooling does not, and the benefits of uncompleted academic programs are highly variable.

Overall, these results confirm the importance of finding related rather than unrelated employment. Therefore completing credentials and coursework is necessary but not sufficient to realize economic benefits, and placement in a related occupation is crucial to realizing the potential benefits of occupational education. While community colleges do have mechanisms to link their programs to employers, enhancing the ability of students to find related employment, in many cases these linking mechanisms are quite weak (Grubb 1996b, Ch. 6). In part, this finding helps explain the variation in returns to different fields of study, since some fields—business and health occupations, for example—have higher rates of related employment than do others; the higher returns associated with completing credentials rather than coursework without credentials is also partly due to this effect. For educational institutions and policy-makers, these results confirm the value of efforts to link programs to employers and to help students find jobs related to their programs of study.

Results by Types of Institutions

In most national data, it is difficult to distinguish different types of postsecondary institutions because individuals are asked about amounts of education but not the institutions from which they received them, or are asked if

they received "vocational training" without any further definition. In most results, therefore, it is likely that preparation from community colleges, from technical colleges and institutes, from area vocational schools, from proprietary schools, and from short-term job training programs are lumped together even though these sources vary substantially in the intensity, duration, and quality of training. This lack of detail may in particular bias downward the estimated effects of some postsecondary education (Table 5) particularly if individuals lump short-term training with education. The SIPP data try to distinguish education from training—and the effects of training on earnings are uniformly negative, surely due to selection effects (Grubb, 1995d), but other data sets are not always so careful.

Only when data include transcripts has it been possible to distinguish types of institutions, since transcripts report the specific institution each individual has attended. In their analysis of the NLS72 data, for example, Kane and Rouse (1995b) found credits from "vocational schools," including both private and public technical institutes, to have negative though insignificant effects for men, while vocational credits from community colleges had positive and significant effects. Credits from private two-year colleges appeared to confer greater benefits than those from public community colleges, for both men and women, though these differences were never significant. My own analysis of these data (Grubb, 1995b) indicated that vocational credits from community colleges had higher effects for men than those from public technical institutes or proprietary schools, while proprietary school credits may have been more valuable for women—but many of these results were statistically insignificant, perhaps because of small sample sizes.

So far, then, it has not been possible to conclude much about the different types of postsecondary institutions, and it is likely that small sample sizes will continue to hamper further research. This is perhaps an area where state data sets, with much more specific information about types of institutions and larger number of students from each, may be more powerful than national data.

The Issues of Timing

Conventional age-earnings profiles indicate that the benefits of postsecondary education may not materialize until individuals are in their late 20s or early 30s. Comparison of the negative results from Breneman and Nelson's (1981) early analysis of the NLS72 data, when students were around 21, with the more positive results from the 1986 follow-up when these students were around 32 by Kane and Rouse (1995b) and Grubb (1995b) also suggests that examining economic effects at young ages may understate the eventual value of postsecondary education. Similarly, Klerman and Karoly (1994) clarified that it may take some time to find an "adult" job—defined as one lasting either one, two, or three years—after the process of milling around often characterizing youth unemployment (Osterman, 1980). For example, only 50 percent of men with baccalaureate degrees were in an adult job (defined as one lasting two years) three years after leaving college, while comparable figures were roughly 30 percent for those with some college and high school diplomas and slightly less than 20 percent for high school dropouts (Klerman & Karoly, 1994, Chart 3). These results indicate that the period of "settling in" can be quite long, and it may not be appropriate to examine employment effects within the first two years of leaving education.

However, at least two studies suggest that economic benefits may materialize relatively early. Surette's (1997) research using the NLS-Youth data simulates the effects of education at different ages with other independent variables controlled. The effects by age are presented in Table 10; they indicate that differentials associated with education emerge as early as age 23, though these differentials continue to increase steadily with age—consistent with conventional age-earnings profiles. Because of significant positive coefficients describing "program effects," the earnings differences are much larger for those completing Associate and baccalaureate degrees than they are for men with some college but without credentials. My estimates using the SIPP data, while cross-sectional rather than longitudinal, are consistent with these results: the returns to

Associate degrees and certificates are if anything higher for the younger cohorts, not older cohorts (Grubb, 1995d).[xxviii]

Finally, some results for specific community colleges reported in Section III find substantial effects of completing credentials on earnings within one to three years of leaving community college. (See especially Tables 13 to 16.) From these results, therefore, completing sub-baccalaureate credentials translates relatively quickly into enhanced employment and earnings, even though the benefits may continue to increase (as in Table 10).

The issue of timing, therefore, merits further analysis. While some results indicate that earnings differentials associated with postsecondary education emerge relatively quickly after students leave formal schooling, others suggest that such benefits may take a while to materialize.[xxix] It is at the very least prudent to be careful about any employment effects measured shortly after leaving college since these may describe the period of "settling in" and thereby understate the longer-run value of postsecondary education. In turn, such patterns might affect enrollments if potential students focus on earnings right after completing education rather than over a lifetime.

Effects on Other Dimensions of Employment

Most analyses of the effects of education have concentrated in either wages or earnings, as summarized in the prior tables. Of course, there are other employment and non-employment effects of formal schooling, some of which are instrumental to earning more over the long run and some of which are valuable in their own right. For example, the results from SIPP data in Table 11 indicate that postsecondary education has a substantial effect on the kinds of occupation individuals find. Overall, postsecondary education reduces the likelihood of working in relatively unskilled sales, in clerical and service positions, and as operatives and mechanics, and increases the probability of working in professional, managerial, and technical positions with higher pay and better prospects for advancement. (These findings are consistent with the results of Monk-Turner for occupational status scores.) An additional value of earning a vocational certificate or Associate degree is that it reduces the amount of time

involuntarily unemployed, on layoff or looking for work. The stability of employment, measured by the month-to-month variation in earnings over the year, is also greater for those with baccalaureate and Associate degrees and vocational certificates.

Similarly, Surette (1997) found a significant effect of both two-year and four-year colleges credits on the probability of employment for young men, though completing an Associate or baccalaureate degree did not significantly improve the likelihood of employment further. In his results sub-baccalaureate education did not affect the annual hours worked, though completing a baccalaureate degree did. However, the finding in Tables 2-5 that economic returns are generally higher for earnings than for hourly wages confirms the effect of additional school on employment.

Table 12 describes the relationship between schooling and the three literacy scales included in the NALS data. Of course the causality underlying these results is complex—since students are selected (and self-selected) into postsecondary education based on their cognitive abilities, at the same time that we hope that additional schooling improves all dimensions of literacy—though the effect of postsecondary education on prose and quantitative scores controlling for family background in Rivera-Batiz (1998, Tables 2 and 3) are distinctly mixed. While literacy is valuable for many purposes, it has substantial effects on employment and earnings too: in Rivera-Batiz (1998, Table 5), the effect of a 100-point increase in quantitative literacy on the earnings of white men and women is 15 percent and 11.6 percent, respectively, even after considering the effect of schooling itself; the effect of a 100 point increase in prose literacy on black men and women is 23.4 percent and 16.2 percent—not much less than the value of earning an Associate degree. (To be sure, the results in Table 12 suggest that a 100-point increase is more substantial than many postsecondary programs might achieve.) The results confirm the dual role of formal schooling, in leading to potential increases in cognitive ability (however measured) that are valuable on the job as well as to various other personal and technical skills. These results also suggest that postsecondary programs emphasizing cognitive gains, and those

integrating cognitive skill development into occupational courses, may have greater effects on employment than others.

The results for Florida in Table 15, on welfare and prison rates, illustrate still other effects of formal schooling. However, most researchers have not yet paid much attention to outcomes of sub-baccalaureate education other than wages and earnings. It is relatively clear that these programs operate by providing access to occupations that have not only higher wage rates but also more stable employment, higher status, greater prospects for promotion, more access to on-the-job training that in turn leads to higher earnings, and better working conditions. This does not happen uniformly, as we have seen, but where it does happen it leads to improved wages and earnings over an entire career.

Explaining the Returns to Sub-baccalaureate Education

Finally, there remains the extremely difficult problem of explaining *why* sub-baccalaureate education leads to better employment and higher earnings—particularly when there is some evidence (presented in Section I) that at this level of the labor market many jobs may not require much formal schooling, few employers require certificates or Associate degrees, and they often prefer experience over formal schooling. One possibility is that signaling of higher ability explains the relationships; that is, higher-ability or more motivated individuals attend postsecondary education, compared with those who are content with high school diplomas, and employers hire for these dimensions of ability or motivation rather than for the competencies acquired in formal schooling (e.g., Spence, 1974). Because of the well-know difficulties of testing signaling theories, this possibility has not been extensively examined, though some of my results are weakly consistent with signaling.[xxx]

Another possibility is that self-selection explains the results in this section (and Section III); that is, the individuals who enroll in postsecondary programs are those who know they can benefit, but other high school graduates (or older workers without credentials) would not (Heckman, 1979). Self-selection is also difficult to examine; the results, which generally treat schooling as a continuous variable rather than as discrete variables distinguishing different types of

education, are so far inconclusive (e.g., Blackburn & Neumark 1995). However, Surette (1997) estimated returns with both conventional statistical methods and a discrete factor estimator, a full-information method that models college attendance as well as wages and employment. The results, summarized in Tables 2-5, indicate that returns are always higher when corrected for self-selection—indeed, more than twice as high (.275 rather than .122) for the Associate degree. The implication is that, while the economic benefits of two-year colleges are substantial, they would be even larger if we could consider certain unobserved variables, including those that cause students to choose community colleges over other educational paths. However, there have not been enough results about self-selection to come to any certain conclusions.[xxxi]

A final kind of response would cite institutional connections as responsible for the returns to postsecondary education. Again based on employer interviews, sub-baccalaureate education may provide an advantage over a high school diploma in several ways (Grubb, 1999), in addition to being required in certain occupations (like health and safety-related occupations) for which licensing is mandatory. Some employers give preference to individuals with postsecondary education over high school graduates with similar experience. Some employers, impressed with local community college programs, try to hire from them even when community college education is not a requirement, or establish working relationships with them, granting their students access to employment in return for having some say over the content of the educational program. In still other cases, co-op and work experience programs establish clear mechanisms of entry into middle-skilled occupations.

In sum, there are numerous aspects of the specific causal mechanisms by which sub-baccalaureate education affects employment that have not yet been extensively investigated—partly because doing so is notoriously difficult. However, for students, administrators, and policy-makers, this greater detail may be necessary in order to make their plans, improve their programs, and decide which kinds of postsecondary education to support.

III. STATE AND LOCAL STUDIES USING UNEMPLOYMENT INSURANCE DATA

The results reviewed so far help resolve some of the debates over the roles of community colleges and other postsecondary institutions. They also provide some rough guidance for students considering what postsecondary education to pursue and for state policy-makers trying to decide what kinds of programs to support. However, for other purposes these national results are not particularly useful. For students contemplating their options, for example, national information is much less valuable than data about specific local institutions. Administrators deciding whether to expand or eliminate programs need incontrovertible evidence about specific programs in their own colleges, not average effects from around the country. For state policy-makers, national results have to be re-interpreted to reflect the different conditions in the states, since community college systems and labor markets vary so much from state to state. Given the local nature of the sub-baccalaureate labor market, only local results will suffice for certain purposes.

Partly in response to these different purposes, some states and local community colleges have improved the collection of data on their students as they leave and progress through the labor market. The major innovation has been to shift from conventional questionnaire-based follow-ups of students, a process typically resulting in very low response rates between 10 percent and 25 percent, to data based on Unemployment Insurance (UI) data. Apparently about twenty states have established such procedures (Seppanen, 1995), most of them driven by the desire for accountability, improvement of student information, or program improvement. This process requires colleges (or states) to link identification numbers (usually Social Security numbers) of students in various educational institutions with the identification numbers in UI wage records. Since the UI system covers all those except the self-employed, the unemployed, those in the military and working for the federal government, and some farmworkers, a relatively comprehensive sample of students can be followed in this way. The matches from this method usually fall in the range of 60 to 90 percent,

considerably higher than rates available from mailed questionnaires. Furthermore, the biases of UI data—particularly the groups not covered—are known, while the biases from non-response to questionnaires are generally unknown. Once a match is made, then information is available on earnings over long periods of time, allowing longitudinal analyses rather than the one-time follow-up typical with previous methods. Those states and colleges that have implemented data systems with UI records have also found the process much cheaper, at least once the system is developed.

However, while the collection of employment information through UI data is conceptually simple, in practice it requires a great deal of cooperation among state agencies and local programs. A variety of technical and computer problems are involved in developing consistent identifiers, definitions, matching procedures, and the like.[xxxii] Furthermore, this process can become highly political, for the simple reason that institutions and programs being asked for data can well imagine that a follow-up system could be used to reduce their funding or eliminate their programs. To quote from a Texas report

> If the data collection entity is feared or mistrusted, partner agencies and service providers may attempt to thwart the negotiation of data exchange agreements. They may "sandbag" their data and "cook their numbers," in response to perverse incentives, or otherwise second-guess the fiscal implications of subsequent program evaluations. They may drag their feet and fail to deliver program participant information in time to take advantage of very narrow windows of opportunity in the record linkage schedule. The follow-up entity responsible for gathering outcome information, therefore, must remain independent and detached from program evaluation and policy-making. (Froeschle & Anderberg, 1997, p. 3)

In some cases political considerations have severely limited the analysis that can be carried out. In some states like Texas, for example, traditions of local control mean that individual colleges control the data and carry out virtually all analyses.

In addition, UI data suffer from a number of inherent problems. The most obvious of these is that the coverage of the UI system is incomplete, and usually individuals moving out of state cannot be located. Because unemployed individuals cannot be matched in UI data, the effect of sub-baccalaureate education on the probability of employment cannot be known. In many states, data are collected only for individuals in particular institutions, and therefore they can be used to compare completers with non-completers—or individuals in different fields of study, or individuals by age, race, gender, and other personal characteristics—but they cannot be used to compare employment and earnings with high school graduates, as the results in Sections II do. (States could overcome this problem by collecting comparable data on high school graduates, as Washington has done in the results in Table 16, but most states have not.) Usually there is very little other data—family background, high school preparation, labor market experience, or ability of any sort—that could be used to control for other courses of variation; most analyses fail to distinguish men from women, even though such data are readily available. Because UI data includes the industry of employment but not the occupation, such data cannot be used with any precision to ascertain whether employment is related or unrelated to an individual's field of study.[xxxiii] While some of these problems (like failure to consider gender) are easily remedied, others are difficult to resolve—suggesting that these state and local results be best used in conjunction with national results. Where the results are relatively consistent, then there is greater assurance that the results are reliable despite the unavoidable data problems.

On the other hand, the potential uses of state and local data are quite varied, and their use is likely to spread. The different uses include the following:

• Program improvement: Employment and earnings measures may be able to identify correctable weaknesses in local programs. For example, a program in childcare or horticulture with low earnings may simply reflect prevailing wages; but it may also be possible to identify higher-paying niches within this occupation. A program with low placement rates may need better outreach efforts.

• Identifying high-wage, high-growth programs: Some of the best community college and job training programs target their efforts on particular

jobs, particularly those with relatively high wages and growing demand[xxxiv]—information that can be provided by UI data.

• Information to prospective students: Data on completion, employment, and wage rates could be used in the guidance and counseling efforts that most community colleges offer. With the establishment of One-Stop Centers funded by the Department of Labor, to provide information and other guidance for individuals searching for appropriate programs, localities need comprehensive information abut the effectiveness of local programs. Several states—including Washington, Texas, and Florida—have moved toward gathering comparable data on different programs.

• Accountability: These data can serve as the basis for state oversight, including the closure of programs that fall below certain standards. Texas requires programs to meet an 85 percent placement standard, requiring that 85 percent of leavers either enter employment, join the military, or enter another educational program; Florida has required 70 percent related placement. In addition, such data can be used for the performance measures required by federal legislation, including the 1998 Amendments to the Carl Perkins Act and the Workforce Investment Act.

• Performance-based funding: It is just a short step from accountability measures to performance-based funding. Florida is planning to allocate 15 percent of funding for postsecondary vocational programs on the basis of performance, using placement and wage rates from its UI data system. Other states like California are contemplating performance-based funding as well.

These various purposes are not necessarily consistent with one another, and the political incentives vary as well. If employment measures are to be used for state accountability or performance-based funding, then there are incentives to "cook the numbers," as the quote above illustrates—in which case the results may be useless for program improvement or identifying occupations to target. Providing information to prospective students requires comparability across different programs, while local program improvement requires information only about programs within a single college. In some cases, state and local administrators differ in their uses of the same data; most obviously, states may use

data for program review and accountability, while institutional researchers and administrators use them to improve the effectiveness of various programs.

There has been substantial variation from state to state in the data collected and in its analysis. To illustrate the results, I first present findings from five states that are in the lead in using UI data: California, Washington, Florida, Texas, and North Carolina. (See also the articles in Sanchez & Laanan, 1998, for more information about results based on UI data.) Because each state has taken a somewhat different approach, these results highlight different possibilities for state and local data.

California

During the 1980s, California experimented with conventional methods of following students with mailed questionnaires. The results widely cited but virtually impossible to find, seem to have been based on very small response rates. When the state developed matching methods with UI data, Friedlander (1993) generated some early outcomes for Santa Barbara and Grossmount Community Colleges, displayed in Tables 13 and 14. The results in Table 13 indicate that, three years after leaving college, those with Associate degrees earned 20 percent more than certificate holders, who in turn earned slightly more (5.0 percent) than those who left with at least 12 credits but without any credential. (Those with fewer than 12 units were eliminated from the analysis on the grounds that they had not completed enough coursework to make any difference.) These differences did not appear the first year after leaving, clarifying the importance of analyzing results after several years. Because those with Associate credentials and those earning 12 units without a credential earned roughly the same *before* leaving college, there is some reason to believe that their education, rather than selection, is responsible. Furthermore, while those students who had been poor ("economically disadvantaged") earned less than those who were not, as one would expect from the considerable literature on the effects of family background, obtaining credentials increased the earnings of both poor and non-poor students and narrowed the gap substantially from what it was prior to leaving college.

Table 14 presents the results for different majors. Clearly, technical fields (drafting, electronics, computer science) and medical occupations (nursing and radiology) have the highest returns, as one might expect. Low-tech fields—restaurant management, graphic arts, business, Office and Information Systems (OIS)—have the lowest returns, with differences sharper three years after leaving college than one year out.

Since Friedlander's early work, the state of California has continued to develop data for the state as a whole and for individual colleges as well. The analysis has tended to follow the patterns in Table 13: that is, median earnings during the last year in college are used as a control for an individual's earning capacity prior to leaving community college. Then median earnings three years after leaving college are used as the measure of post-education outcomes. The results, displayed in Table 15, are available for different types of students.[xxxv] In general they confirm some familiar patterns: while the overall increase in earnings from the last year of college to three years after leaving is modest (12.4 percent), the increase is much greater for those earning Associate degrees (54 percent) and certificates (29.3 percent) than for those with less than 12 credits, who earn only 7.8 percent more. The increases are roughly the same for men and women, and for all racial and ethnic groups except blacks, for whom the increase is quite small (2.7 percent), suggesting a potentially serious problem with labor market discrimination. (However, results for those earning Associate degrees and certificates suggest that there is no black/white difference, though Hispanics earn less than whites.) More detailed results indicate higher returns for women compared to men, consistent with results in Tables 3 and 4 (Sanchez & Laanan, 1998, Tables 13 and 14, Figures 7 and 8.) The increases are much higher (49.1 percent) for traditional-age students,[xxxvi] while they actually decline for those 35 and older, whose four-quarter employment rate also falls from 81.2 percent to 73.5 percent; the latter group includes dislocated workers forced out of stable, high-paying jobs in unionized sectors or the military and aerospace sectors, and being retrained for less lucrative positions, while traditional-age students benefit the most from moving from essentially unskilled positions into more substantial employment. The results in the last part of the table indicate particularly large

increases (both relative and absolute) for those who are academically disadvantaged, economically disadvantaged,[xxxvii] or disabled, while LEP (Limited English Proficient) and non-LEP students benefit about the same amount in relative terms. Evidently, then, community college education does benefit those who enter with certain forms of disadvantage.

In addition, certain results are available by field of study. They show, not surprisingly, large increases for nursing, drafting, automotive programs; gains are relatively small for business and commerce, accounting, and computer programming—which at the community college level are all likely to be preparing data entry clerks. While there are few real surprises here, the results add to the national findings in Table 6.

Washington

Washington has taken the unusual step of collecting UI data for many programs, including secondary vocational education, postsecondary occupational preparation at community colleges, adult basic skills education, and JTPA, distinguishing the results for adult, youth, and dislocated workers. For each one, a comparison group has been constructed to compare those enrolled in programs with similar groups that have not enrolled. Constructing such comparison groups are always difficult, and I suspect that the comparison groups for community colleges consist of less able individuals than those who attend college.[xxxviii] The results include only individuals with at least 10 credits, so even those designated leavers have achieved some minimal amount of postsecondary education.

Some results of this procedure are shown in Table 16, which like the California results indicate a widening difference over time in employment rates, wage rates, and earnings (but not hours worked) between community college students and the comparison group. In other results, the effects are larger for completers than for non-completers; for example, hourly wages during the third postprogram quarter were $1.86 an hour higher for completers and $0.22 for leavers; during the 13th quarter these were $3.14 and $0.46 respectively.[xxxix] The state then carried out a benefit-cost analysis of postsecondary occupational training using employment results (Workforce Training and Education

Coordinating Board, 1997, Figure 16). They indicate short-term benefits to participants at the expense of taxpayers, and long-run benefits to both participants and taxpayers as increased taxes and reduced welfare benefits more than offset the initial costs of providing education. These results—precisely what advocates for public education and training would wish for—have been used by the state's advisory agency (Workforce Training and Education Coordinating Board) to bolster the case for additional education and training. The results for other programs suggest that adult basic education and JTPA youth programs, with costs outweighing benefits, need "substantial changes;" and recommendations for more job placement, information about career opportunities, and more math, computer, and problem-solving are based on information from students and employers.

Washington has also developed separate analyses for students in its community colleges. Consistently, those completing certificates and Associate degrees have higher wages than those leaving without certificates (16.6 percent higher for the class of '93-'94, though only 4.7 percent higher for the class of '95-'96), higher employment rates (83 percent versus 76 percent for the class of '95-'96, for example). As a result of these findings, retention and completion of credentials have become higher priorities (Seppanen, 1998). Median wages vary in obvious ways, with health occupations, industrial technicians, and airframe/power plant mechanics having the highest wages and personal services, cosmetology, administrative support (clerks), and early childhood education having especially low wages. The data on different occupations have increased the emphasis on providing programs in higher-wage areas and on including more minority students in such programs.

Other special reports examine high-, middle-, and low-wage programs, based on the average earnings of graduates. The results, in Table 17, use the pre-college wage as a rough control, as the California results do. While these simple results do not indicate much benefit from completing credentials, except for those in high-wage programs, the lack of controls for gender, work experience, and labor force attachment may explain the lack of such differences. The results confirm the value of being in high-wage programs rather than middle-or low-wage programs. They also suggest that different programs have selection (or self-

selection) mechanisms operating, since the pre-college wages of those in high- and middle-wage programs are higher than those of other students. This finding is consistent with entrance requirements for over-subscribed health programs, math and science requirements for certain technical programs, and the likelihood that some individuals use community colleges to progress within occupations where they are already employed. More recent versions of these results (Seppanen, 1998, Table III) have clarified the large differences between high-wage and low-wage fields, along with the conclusion that completion may not benefit individuals in low-wage programs. Based on these results, some policy-makers have started to rethink the emphasis on low-wage jobs for welfare recipients, and have tried to create linkages or "ladders" to higher-wage occupations.

With these data available, the Washington State Board for Community and Technical Colleges has published a series of more detailed reports. One, for example, examined minority students, finding their completion rates and their enrollment in high-wage programs lower than for white students (Washington State Board for Community and Technical Colleges, 1997). Others examined welfare recipients and dislocated workers. In addition, many of the results in Washington are available for individual colleges, and such detailed results are published. It is not yet clear how such results are being used by individual colleges, partly because the results are quite political and because the data are not yet well-known. However, researchers and administrators at Bellevue Community College have described their value in identifying high-wage programs, responding to state accountability requirements, and developing partnerships with employers in information technology (Hutchinson, Kline, Mandt, & Marks, 1998). Once data with comprehensive ways of identifying students become available, they can be used for a variety of state and local purposes.

Washington proposed using these data to monitor a requirement that graduates of all programs earn at least $12 an hour. However, while such a target is feasible for health and computer-related programs, it is almost impossible for those occupations in agriculture, early childhood education and personal services, or for colleges in rural areas. Programs for welfare recipients were also afraid that they could not meet this target. (A method based on regression adjustments—such

as that used in some states to adjust JTPA performance standards—could develop standards that vary by occupational area, region, and composition of programs or colleges.) The outcry from local colleges forced the state to rescind the requirement. This incident illustrates perfectly the pitfalls in establishing outcome standards: with so much variation among colleges, among occupational areas, and among students, any simple standard is likely to be impossible to meet.

Florida

Florida has gone further than any other state in adopting market-like mechanisms to guide its education and training programs (Grubb et al., 1999). One strand of this strategy has been FETPIP, the Florida Education and Training Placement Information Program, which includes data on every kind of public education. It can therefore be used to track the progression of students throughout the system. For example, some results indicate that the Associate of Arts degree facilitates transfer to four-year colleges, since four years later 46.9 percent of individuals in the 1990-91 cohort with an A.A. had earned a B.A.; but no other kind of schooling was effective in promoting transfer. Furthermore, the results indicate some serious problems in progression through the state's system. For example, of those who had earned some community college vocational credits in 1990-91, only 4 percent had attained a credential four years later; completion rates were similarly small for those who earned credits in district postsecondary programs. Results like those can identify possible bottlenecks in a state's postsecondary system.

The FETPIP system collects data on earnings from the UI wage record files as well. The results in column 1 of Table 18 they seem to indicate that those with any postsecondary vocational credits—whether in district postsecondary programs, community college adult programs, or regular community college programs—earn substantially more than high school graduates. Individuals with Associate of Science degrees earn more than twice as much as high school graduates (a much higher figure than any in Table 3), even more than those with baccalaureate degrees; those with an Associate of Arts degree (largely in academic subjects) earn *less* than those with vocational credits. However, these

results are difficult to interpret because they include individuals with varying levels of experience. Of those in the 1990-91 cohort, one group—called the "apples" in this analysis (in column 2)—includes those who made no educational progress during the intervening four years;[xl] potentially, they have four more years of labor market experience, but have not attained a higher level of formal schooling. The second group—called the "oranges" (in column 3)—includes the "apples" plus those who attained each level of education between 1990-91 and 1994-95. Because this second group by definition has been in school during the intervening period, they are likely to have less labor market experience, and sure enough their earnings are lower than those of the "apples." Therefore results that combine "apples" and "oranges" are difficult to interpret; even within the group of "apples" experience may vary substantially.

Other results suggest different confounding effects. For example, individuals with Associate of Science degrees earn more than those with baccalaureate degrees, which is puzzling. However, when nurses are excluded, those with A.S. degrees earn slightly less than those with baccalaureate degrees, re-establishing the expected pattern. The moral is that without disentangling the effects of experience, field of study, and gender—since men and women are combined in these results—it is difficult to make too much of these findings.

FETPIP includes information about employment and earnings for specific occupational programs. The results are quite consistent with those in Table 8, for example, though more detailed. The highest-paying occupations for those with community college credits are health-related, and the lowest-paid include child care and office workers; for those with A.S. degrees, the top-paid programs include a number of technician programs (including electrical power, aviation maintenance, instrumentation engineering) and a few business programs (like agricultural business and international business management). Here the failure to separate results for men and women is surely misleading since certain high-paid occupations for women (like nursing) do not appear especially high in the overall rankings, though they certainly would be if results were distinguished by gender.

Because FETPIP includes information from the state's welfare and corrections agencies, the data can indicate the effect of education on the receipt of

public assistance (food stamps or AFDC) and involvement with corrections (incarcerated or on parole). The results, in Table 19, are stark reminders of the effects of education (and associated employment opportunities) on both welfare and crime: high school dropouts are at greatest risk of both receiving welfare and being incarcerated, and those with community college vocational education and postsecondary credentials have by far the lowest risk. These results are hardly surprising, of course, but they indicate the ways in which a state's data system can incorporate outcomes other than employment and earnings.

Florida is currently moving toward performance-based funding, where 15 percent of funding will be based on performance. The state is currently debating how performance is to be measured and weighed, though completion rates and job placement rates measured by FETPIP are likely to be included; other measures currently being discussed, such as the duration of initial employment, are still controversial, or are not well measured by FETPIP.

The Florida experience indicates the varied uses of a system incorporating UI wage record data as well as information from a variety of state agencies. The information on flows through the system, for example, provide information on patterns of transfer and completion that can be obtained in no other way. The results for specific kinds of programs—distinguishing district-sponsored vocational programs from short-term programs in community colleges from completers and non-completers in community colleges—provide information specific to Florida's particular educational structure that national data could never generate. And results about welfare and incarceration rates, while unsurprising, provide reinforcement for the value of preventing high school dropout.

Texas

Texas used to have a system of following graduates through questionnaires, with very low response rates. The current efforts to develop a UI-based data system began in the late 1980s, when several colleges wanted to develop measures of effectiveness as part of accreditation reviews. While the state (through the State Occupational Information Coordinating Committee) has been the leader in developing the data system, the analyses of these data are largely the

responsibility of local colleges—consistent with Texas' history of strong local control. The office of institutional research at each community college gets data from the state's Higher Education Coordination Board and controls how the data are used and pays for any analyses.

As a result of local control, there is little state-level analysis. One exception is Table 20. An exception includes the results in Table 20, published as part of the state's "report card" on all education and training programs. They confirm the value of completing credentials over leaving without credentials, particularly for those in technical preparation programs. Overall, however, Texas provides an example where local control has limited the extent of state analysis.

In addition, the Texas Higher Education Coordinating Board gets program-level data for each community college. Then an "institutional effectiveness team" from the board visits each college to discuss the results. Texas has a performance standard requiring that 85 percent of students leaving must either enter the labor force, enter the military or transfer into another education program. Those programs that do not meet the standard can generate their own data based on follow-up surveys so that programs affected by self-employment (like cosmetology and real estate) or mobility out of the state are not unfairly reviewed.

Finally, there is some interest in the legislature in shifting to a performance-based funding system using still other measures of program effectiveness, though this is still under discussion. As in other states like Florida, the shift to performance-based funding is a slow process, with the development of a statewide data system a necessary prerequisite.

North Carolina

North Carolina's Common Follow-up System (CFS) now includes such agencies as the Departments of Correction, Labor, and Employment and Training, as well as the agencies responsible for K-12 education, community colleges and the university system (Common Follow-up System, 1998). Some preliminary results for community colleges are presented in Table 21, to illustrate the importance of controlling for experience or—as a proxy—for age. In these results,

"certificates" are generally programs of less than one year, "diplomas" are awarded for one-year programs, and the A.A.S. degree is a two-year degree, mostly in occupational areas. The earnings differences among those with varying credentials are trivial for those 21 to 24 and even 25 to 29, when those with A.A.S. degrees earn more than those with baccalaureate degrees—no doubt because of patterns of experience. The expected patterns emerge only in the 35 to 39 age group; then the absolute differentials increase for those 40 and over. Once again, these results indicate the problems of relying on earnings too soon after leaving postsecondary education, and of examining earnings without disentangling the effects of experience.

North Carolina has paid some attention to disaggregating groups of students, distinguishing students who leave and return to school ("comeback" students)—and who may earn less because they are working part-time—as well as those of different ages and with different diplomas. The results in Table 22 clarify the importance of disentangling age, experience, and purpose (see also results in Gracie, 1998). For traditional-age students under age 25, those leaving with credentials earned 16.5 percent more than those leaving without credentials. However, these patterns are reversed for older groups, among whom non-completers earn substantially more than completers. If older completers are already employed and enroll for short periods of upgrade training, they will show up as noncompleters with high earnings, whereas those who enroll for retraining—dislocated workers searching for new careers, for example—are likely to complete credentials but then be forced to find entry-level employment. Therefore information on prior earnings (as in the California data), or student intentions, or age and experience are necessary to interpret these results.

Some Conclusions and Future Prospects

Overall, the results using state and local data confirm most of the findings from national studies. The economic benefits of sub-baccalaureate education are relatively clear, particularly to students completing Associate degrees and certificates, though the comparisons vary from state to state. The variation in benefits among fields of study has been confirmed in several states, with more

detail than is available in national data. The benefits of small amounts of community college remain unclear (as they are for national results), partly because comparisons with individuals completing high school only are usually unavailable; in some cases non-completers appear to benefit more than those completing credentials do, though—as in the North Carolina results—this pattern may reflect experienced workers seeking upgrade training. Many of the state results indicate that the benefits materialize relatively quickly, within three years of leaving education—though the long-run effects may be even greater, as the results in Table 22 from North Carolina suggest. In some states, the data also clarify the relatively low rates of completion in community colleges and other sub-baccalaureate programs, though so far there has been little made of this finding because it is politically sensitive. Furthermore, state-generated data can be used for purposes other than determining the results for particular programs: the ability to compare different postsecondary programs, as Washington has done, or to examine the transitions among different kinds of postsecondary education (and into prisons and welfare), as in Florida, is possible when states develop UI data for all programs within a state.

Of course, it is not difficult for a hard-nosed statistician to critique these results. They may reflect variation in motivation, or ability, or labor market experience; the substantial differences between the experiences of men and women are not reflected in these numbers (though they could easily have been differentiated); other dimensions of family background, or race and ethnicity, or ability or high school achievement are largely missing, or are not even considered even in cases (like California) where such data are available; and patterns evident shortly after leaving education may vanish in subsequent years. In addition, since data are available for all community colleges in a state, an analysis of the variation among colleges could examine the effect of local economic conditions and employment composition on the economic benefits of community colleges. Much more precise analyses could be performed with these state data, either by using more detailed breakdowns of students or by performing simple regression analyses. Furthermore, adding data on student characteristics that many colleges

already have in their records would increase the power of these results considerably.

In many states, the problems of developing UI-based data have been so substantial that more precise analyses have not yet been possible. In other cases, political issues—the power of local control, for example, or the dislike by legislators of complex analyses—have prevented more sophisticated analyses. But as states move to use these data in more substantial ways, for accountability and performance-based funding, the problems created by overly simple analysis are likely to generate local opposition from colleges who can rightly claim that state figures misstate their local experiences. We might anticipate, then, that political pressures will force states into more sophisticated analyses.

A number of other states are in the process of developing data systems based on UI wage records. Many states are aware of the progress made in other states (particularly Florida and Texas), and the field guide by the directors of efforts in these two states (Anderberg & Pfeiffer, 1998) provides guidance to states wanting to take this path. The pressures for accountability from the state level continue to mount, as well as from the federal level. The 1998 amendments to federal legislation for vocational education and the Workforce Investment Act both require performance measures including placement and wage rates, measures that are readily calculated when a state has UI-based data but that are difficult and expensive without one. We might anticipate, therefore, that more and more states would develop UI-based data, as a way of responding to pressures for accountability.

As states continue to develop their data systems and analyses, the purposes of such results are likely to expand as well. Currently, the results are being used, it appears, to examine the economic value of community colleges and other postsecondary programs, and to develop accountability measures. In a few states, these data have been used to identify problem areas—programs with low completion rates, low placement rates, or low earnings, for example—and then to rethink state policy; Washington, which has begun to emphasize completion and identification of higher-wage programs for welfare recipients, provides a good example. The value of these data in providing information to prospective students

is now being explored, particularly as one-stop centers expand. And given the widespread emphasis on performance, their use as the basis for performance-based funding (as in Florida) may not be far behind. Of course, the quality of data and analysis must be up to the challenges of these varying purposes. But in a political system, the inappropriate use of data will be challenged by those institutions harmed by such practices; as long as there is a forum for state and local officials to discuss the results, the process should improve our understanding of effectiveness. And so we can anticipate that state and local data on employment effects will continue to develop, though the process is unlikely to be smooth or fast.

IV. THE FUTURE OF SUB-BACCALAUREATE EDUCATION: IMPROVEMENT THROUGH ANALYSIS

The information about sub-baccalaureate education has improved considerably over the past five years. Virtually all the national results in Section II rely on research since the early 1990s and the state and local results in Section III depend on data systems that have been completed within the past decade. With improved information, some of the debates about community colleges and other non-baccalaureate postsecondary institutions can be put to rest. Evidently, the critics of community colleges are incorrect in their wholesale condemnation of these institutions: they do allow individuals to advance into "better" jobs—more stable, more likely to be professional or managerial, of higher status—and they increase earnings, certainly for those who complete Associate degrees, and also (in many but not all data) for those who complete certificates or the equivalent (one year of credits, for example). The benefits appear to hold up for groups of special concern—blacks, older individuals, dislocated workers, and (in various state data) other groups of disadvantaged individuals—and the returns are generally slightly higher for women than for men.

But contrary to the advocates for community colleges, and contrary to the "naive" interpretation of human capital theory, postsecondary education does not improve employment under all conditions. Some occupational fields have much

higher returns than others, and the value of certain occupational fields (like education and agriculture) and to academic subjects for those who do not transfer is low and uncertain. Finding employment related to a student's field of study is critical to realizing the benefits of many occupational programs, so that placement may be necessary in addition to education itself. While completion of credentials is generally beneficial—there are relatively substantial "program" or "sheepskin" effects—the returns to postsecondary education for those who fail to complete credentials is small and uncertain. Some such individuals appear to benefit, perhaps older and experienced students; but in other cases the additional earnings are insignificant or trivial and the very small amounts of postsecondary education among many students —"uncommitted" students or, perhaps, "experimenters" learning more about postsecondary alternative—provide little benefit. And so there is reason for continued concern about the high rates of non-completion in community colleges and other postsecondary institutions.

At the same time that data have improved substantially, a number of issues remain unclear. Among them is the complex of issues surrounding non-completion. There are now many estimates of the benefits of postsecondary education short of credentials, but they vary substantially—and occasionally, particularly in state data, non-completers earn more than completers. But there is little empirical work to disentangle *why* students fail to complete, or how their purposes might affect economic returns, although some states have identified discrete groups of students—like the North Carolina efforts to clarify the effects for older and younger students, the concept of the "marketable achiever" in Texas, or the earlier efforts in California to distinguish "job seekers" with unclear goals from "job upgraders" with clear purposes.[xli] Additional detail about student intentions, *if* accurate, might help in learning more about the causes of non-completion and about what conditions influence the returns to small amounts of postsecondary education.

Another issue that merits further attention is the cyclical variation in returns to schooling. Based on the comments of employers, individuals with community college education are more likely to be let go during downturns than college graduates, though they may have more job security than high school

graduates. Therefore the returns to sub-baccalaureate education relative to a high school diploma might increase during recessions because of these employment effects, though its value relative to a baccalaureate degree would decrease. We already know that enrollments increase during recessions, because opportunity costs of attending community college decrease (e.g., Betts & McFarland, 1992), but there might be cyclical effects on the employment side as well. However, no one has yet examined these potential influences for sub-baccalaureate education.[xlii]

In addition, the state of the local labor market might affect returns to sub-baccalaureate education. Hanushek (1973, 1981) determined that the returns to schooling vary substantially across geographic areas.[xliii] If the sub-baccalaureate labor market is relatively local, then any differentials in returns to schooling will persist more for middling levels of education than for higher levels, and regional shortages and surpluses in certain occupations may also persist in addition to wage differentials. To my knowledge, however, no one has investigated the patterns among local labor markets since Hanushek. Particularly if states move to use wages and placement rates to measure effectiveness among colleges located in distinctly different economic regions, it will be necessary to understand more clearly the effects of local economic conditions much better.

What about the future? Labor market projections suggest that sub-baccalaureate education will continue growing—though not as quickly as baccalaureate and graduate education—as part of the longer-run process of educational inflation (or educational advancement) that has taken place throughout this century. It is likely that much of this growth will come from students who fail to complete either two- or four-year colleges, particularly if current patterns continue: the deterioration of secondary schools increasing the numbers of unprepared students entering postsecondary education; the hostility toward providing remedial education; the shift toward distance education and computer-based methods providing little support for students who are not already independent; the tendency for public colleges to become overcrowded and make it difficult for students to get the necessary coursework; the reduction in funding for tutoring, financial aid offices, placement offices, and other forms of student

support as community colleges face stagnant funding with increasing numbers of underprepared students. In many ways, the future of sub-baccalaureate education does not seem particularly bright.

However, information about effectiveness—including both national studies as well as the developing state and local results—provides a way of understanding what is happening in our postsecondary institutions, of identifying the successes as well as the problems to be remedied. If funding patterns, or institutional incentives, or student behavior are inappropriate—that is, if they make it difficult for students to realize their goals, or contribute to reduced completion, or lower the economic benefits—then data about employment outcomes can reveal these problems and prompt state policy-makers and local administrators to take steps to resolve them. Such use of data is part of making institutions self-conscious about their effectiveness and becoming self-reforming institutions. As a vice-president for instruction in one particularly innovative community college replied, when we asked what the institution did to improve instruction (Grubb & Associates, 1999, Ch. 8):

> I think it is getting the data. I think the faculty know a lot of the data. ... If I'm not graduating any ethnic minorities, I know it. If you start publishing data across the college that says that, then I sit and I start thinking, hmmm, maybe we could be doing something differently. So I think that the kind of data we put out makes people bring things they know in the back of their heads to the front of their heads, and start deciding to do something about it.

"Getting the data" reflects an institution-wide sensitivity to outcomes, using various measures to diagnose problems and then develop specific programs of improvement. And so the highest hope is that a better understanding of the employment effects of sub-baccalaureate education will, in the long run, help enhance them.

REFERENCES

Adelman, C. (1990). A college course map: Taxonomy and transcript data. Washington, DC: U.S. Department of Education.

Anderberg, M., & Pfeiffer, J. (1998, May). A field-guide to automated follow-up. Washington, DC: Employment and Training Administration, U.S. Department of Labor.

Averett, S., & D'Allessandro, S. (forthcoming). Racial and gender differences in the returns to two-year and four-year degrees. Economics of Education Review.

Baj, J., Trott, C., & Stevens, D. (1991, January). A feasibility study of the use of unemployment insurance wage-record data as an evaluation tool for JTPA (Research Report No. 90-02). Washington, DC: National Commission for Employment Policy.

Berkner, L., Cuccaro-Alamin, S., & McCormick, A. (1996, March). Descriptive summary of 1989-90 beginning postsecondary students: Five years later (NCES 96-155). Washington, DC: Office of Educational Research and Improvement, U.S. Department of Education.

Betts, J., & McFarland, L. (1992, July). Safe port in a storm: The impact of labor market conditions on community college enrollments. Journal of Human Resources 30(4), 741-765.

Blackburn, M., & Neumark, D. (1995). Are OLS estimates of the return to schooling biased downward? Another look. Review of Economics and Statistics, 77(2), 217-223.

Blair, L., Finn, M., & Stevenson, W. (1981). The returns to the Associate degree for technicians. Journal of Human Resources, 16, 449-458.

Blau, F., & Ferber, M. (1992). The economics of men, women, and work. Englewood Cliffs, NJ: Prentice-Hall.

Blaug, M. (1972). The correlation between education and earnings: What does it signify? Higher Education, 1, 53-76.

Boesel, D., & Fredland, E. (1998, June). Is there too much emphasis on getting a college degree? Washington, DC: National Library of Education.

Breneman, D., & Nelson, S. (1981). Financing community colleges: An economic perspective. Washington, DC: Brookings Institution.

Brint, S., & Karabel, J. (1989). The diverted dream. New York, NY: Oxford University Press.

Cameron, S., & Heckman, J. (1993, January). The non-equivalence of high school equivalents. Journal of Labor Economics, 11(1).

Clark, B. R. (1960, May). The 'cooling-out' function in higher education. American Journal of Sociology, 65, 560-576.

Clark, B. R. (1980). The cooling-out function revisited. New Directions for Community Colleges, 8(4), 15-32.

Cohen, A. M., & Brawer, F. B. (1989). The American community college (2nd ed.). San Francisco, CA: Jossey-Bass.

Common follow-up system of North Carolina, 1998 Report. (1998, May). Raleigh, NC: Employment Security Commission.

Deich, S., & Masten, C. (1994). Employment outcomes. In D. Boesel, L. Hudson, S. Deich, & C. Masten (Eds.), Participation in and quality of vocational education (National Assessment of Vocational Education, Final Report to Congress, Vol. 3). Washington, DC: Office of Educational Research and Improvement, U.S. Department of Education.

Dougherty, K. (1987, April). The effects of community colleges: Aid or hindrance to socioeconomic attainment? Sociology of Education, 60, 86-103.

Eck, A. (1993, October). Job-related education and training: Their impact on earnings. Monthly Labor Review, 116(10), 21-38.

Effectiveness of California community colleges on selected performance measures. (1997, October). Sacramento, CA: Accountability Unit, Policy Analysis and Management Information Services Division, Chancellor's Office.

Friedlander, J. (1993, Fall). Using wage record data to track the post-college employment and earnings of community college students. Santa Barbara, CA: Office of Academic Affairs, Santa Barbara City College.

Friedlander, J. (1996, February). Using wage record data to track the post-college employment rates and wages of California community college students.

Santa Barbara, CA: Office of Academic Affairs, Santa Barbara City College. (ERIC Document ED 390 507)

Froeschle, R., & Anderberg, R. (1997, June). Roles and responsibilities in a performance measurement system: Description, prescription, and policy-making. Beyond the numbers: Labor Market Information Research and Writings (vol. 1). Austin, TX: Texas SOICC.

Gracie, L. (1998, Winter). Measuring outcomes of workforce development and the economic impact of attending a North Carolina community college. In J. Sanchez, & Laanan, F. (Eds.), Determining the economic benefits of attending community college. New Directions for Community Colleges (No. 104, pp. 53-60). San Francisco, CA: Jossey-Bass.

Groot, W., Osterbeck, H., & Stern, D. (1995, August). A sequential profit model of college choice and wages. Berkeley, CA: National Center for Research in Vocational Education, University of California.

Grubb, W. N. (1989a). Dropouts, spells of time, and credits in postsecondary education: Evidence from longitudinal surveys. Economics of Education Review, 8(4), 49-67.

Grubb, W. N. (1989b). Access, achievement, completion, and "milling around" in postsecondary education. Berkeley, CA: MPR Associates, for the National Assessment of Vocational Education, U.S. Department of Education.

Grubb, W. N. (1989c). The effects of differentiation on educational attainment: The case of community colleges. Review of Higher Education, 12(4), 349-374.

Grubb, W. N. (1990, October). The causes of enrollment in postsecondary education: Evidence from the National Longitudinal Study of the Class of 1972. Unpublished paper.

Grubb, W. N. (1991, March/April). The decline of community college transfer rates: Evidence from national longitudinal surveys. Journal of Higher Education, 62(2), 194-222.

Grubb, W. N. (1992a, Winter). The economic returns to baccalaureate degrees: New evidence from the class of 1972. Review of Higher Education, 15(2), 213-232.

Grubb, W. N. (1992b, September). Finding an equilibrium: Enhancing transfer rates while strengthening the comprehensive community college. Washington, DC: National Center for Academic Achievement and Transfer.

Grubb, W. N. (1992c). Postsecondary vocational education and the sub-baccalaureate labor market: New evidence on economic returns. Economics of Education Review, 11(3), 225-248.

Grubb, W. N. (1993a, Spring). The varied economic returns to postsecondary education: New evidence from the class of 1972. Journal of Human Resources, 28(2), 365-382.

Grubb, W. N. (1993b, Spring). The long-run effects of proprietary schools on wages and earnings: Implications for federal policy. Educational Evaluation and Policy Analysis, 15(1), 17-33.

Grubb, W. N. (1993c). Further tests of screening on education and observed ability. Economics of Education Review, 12(2), 125-136.

Grubb, W. N. (1994, Fall). The long-run effects of proprietary schools: Corrections. Educational Evaluation and Policy Analysis, 16(3), 351-356.

Grubb, W. N. (1995a, Winter). The sub-baccalaureate labor market and the advantages of co-operative education. Journal of Cooperative Education, 30(2), 6-19.

Grubb, W. N. (1995b, Winter). Response to comment. Journal of Human Resources, 30(1), 222-228.

Grubb, W. N. (1995c). Education through occupations in American high schools (Vols. 1-2). New York, NY: Teachers College Press.

Grubb, W. N. (1995d, May). The returns to education and training in the sub-baccalaureate labor market: Evidence from the survey of income and program participation, 1984 - 1990. Berkeley, CA: National Center for Research in Vocational Education.

Grubb, W. N. (1995e, Summer). The economic returns to baccalaureate degrees: Corrections. Review of Higher Education, 18(4), 483-490.

Grubb, W. N. (1995f, September). Postsecondary education and the sub-baccalaureate labor market: Corrections and extensions. Economics of Education Review, 14(3), 285-301.

Grubb, W. N. (1996a). Learning to work: The case for re-integrating education and job training. New York, NY: Russell Sage Foundation.

Grubb, W. N. (1996b). Working in the middle: Strengthening education and training for the mid-skilled labor force. San Francisco, CA: Jossey-Bass.

Grubb, W. N. (1997). The returns to education in the sub-baccalaureate labor market, 1984-1990. Economics of Education Review, 16(3), 231-246.

Grubb, W. N., & Associates. (1999). Honored but invisible: An inside look at teaching in community colleges. New York & London: Routledge.

Grubb, W. N., Badway, N., Bell, D., Bragg, D., & Russman, M. (1997). Workforce, economic and community development: The changing landscape of the entrepreneurial community college. Mission Viejo, CA: League for Innovation in the Community College.

Grubb, W.N., Badway, N., Chi, B., King, C., Herr, J., Prince, H., Kazis, R., Hicks, L., & Taylor, J.C. (1999). Toward order from chaos: State efforts to reform workforce development systems (MDS-1249). Berkeley, CA: National Center for Research in Vocational Education.

Grubb, W. N., Dickinson, T., Giordano, L., & Kaplan, G. (1992, December). Betwixt and between: Education, skills, and employment in sub-baccalaureate labor markets. Berkeley, CA: National Center for Research in Vocational Education.

Grubb, W. N., & McDonnell, L. (1996, Spring). Combating program fragmentation: Local systems of vocational education and job training. Journal of Policy Analysis and Management, 15(2).

Grubb, W. N., & Ryan, P. (1999). Plain talk on the field of dreams: The roles of evaluation for vocational education and training. Geneva: International Labour Office.

Grubb, W.N., & Wilson, R. (1992). The effects of demographic and labor market trends on wage and salary inequality, 1967-1988. Monthly Labor Review 115(6), 23-39.

Hanushek, E. (1973). Regional differences in the structure of earnings. Review of Economics and Statistics, 55(2), 204-213.

Hanushek, E. (1981). Alternative models of earnings determination and labor market structures. Journal of Human Resources, 16(2), 238-259.

Heckman, J. (1979). Sample selection bias as specification error. Econometrica, 47, 153-161.

Heinemann, H. & Sussna, E. (1977, October). The economic benefits of a community college education. Industrial Relations, 16, 345-354.

Higher Education Research Institute. (1994). The American freshman: Twenty-five year trends. Los Angeles, CA: Higher Education Research Institute, University of California at Los Angeles.

Hollenbeck, K. (1993). Postsecondary education as triage: Returns to academic and technical programs. Economics of Education Review, 12(3), 213-232.

Hutchinson, K., Kline, S., Mandt, C., & Marks, S. (1998, Winter). Partnering to identify and support high-wage programs. In Sanchez, J., & F. Laanan (Eds.), Determining the economic benefits of attending community college. New Directions for Community Colleges (No. 104, pp. 61-68). San Francisco, CA: Jossey-Bass.

Jacobson, L., LaLonde, R., & Sullivan, D. (1997, December). The return from community college schooling for displaced workers (Working Paper WP-97-16). Chicago, IL: Federal Reserve Bank of Chicago.

Kane, T., & Rouse, C. (1993, December). Labor market returns to two- and four-year colleges: Is a credit a credit and do degrees matter? (Working Paper No. 311). Princeton, NJ: Industrial Relations Section, Princeton University.

Kane, T., & Rouse, C. (1995a, Winter). Comment on W. Norton Grubb, The varied economic returns to postsecondary education: New evidence from the Class of 1972. Journal of Human Resources, 30(1), 205-221.

Kane, T., & Rouse, C. (1995b, June). Labor market returns to two- and four-year colleges. American Economic Review, 85(3), 600-614.

Karabel, J. (1972). Community colleges and social stratification. Harvard Educational Review, 42(2), 521-562.

King, C., Lawson, L., Olson, J., Trott, C., & Baj, J. (1998, October). Training success stories for out-of-school youth: Past effects and lessons for the future. In B. Barnow, & C. Kings (Eds.), Improving the odds: Increasing the effectiveness of publicly-funded training. Washington, DC: Urban Institute Press.

Kirsch, I.S., Jungeblut, A., Jenkins, L., & Kolstad, A. (1993, September). Adult literacy in America: A first look at the results of the national adult literacy survey. Washington, DC: National Center for Education Statistics, U.S. Department of Education.

Klerman, J., & Karoly, L. (1994, August). Young men and the transition to stable employment. Monthly Labor Review, 117(8), 31-48.

Laanan, F. (1998, Winter). Descriptive analyses of students' post-college earnings from California community colleges. In J. Sanchez, & F. Laanan (Eds.), Determining the economic benefits of attending community college. New Directions for Community Colleges (No. 104, pp. 77-88). San Francisco, CA: Jossey-Bass.

LaLonde, R. (1995, Spring). The promise of public sector-sponsored training programs. Journal of Economic Perspectives, 9(2), 149-168.

Lanham, C., & Whitfield, D. (1997, May). Apples and oranges: Comparison of outcomes for the graduates of 1990-91. A continuous study of "The Whole Picture." Paper presented at the meeting of the Association for Institutional Research, Tallahassee, Florida Board of Regents and FETPIP.

Lanham, C., & Whitfield, D. (1998, May). Highways, byways, and sideways: Routes taken by Florida's high school graduates of 1990-91 toward their baccalaureate degree. Tallahassee, FL: Florida Board of Regents and FETPIP.

Lapp, J., & Mote, C. (1915). Learning to earn: A plea and a plan for vocational education. Indianapolis, IN: Bobbs-Merrill.

Leigh, D., & Gill, A. (1997). Labor market returns to community colleges: Evidence for returning adults. Journal of Human Resources, 32(2), 334-353.

Leslie, L., & Brinkman, P. (1988). The economic value of higher education. New York, NY: American Council on Education and Macmillan Publishing.

Levesque, K. A., & Alt, M. N. (1994, July). A comprehensive guide to using unemployment insurance data for program follow-up (Grant No. E-9-4-2-40-59). Berkeley, CA: Institute for the Study of Family, Work, and Community.

Lewis, D. R., Hearn, J. C., & Zilbert, E. E. (1993, July). Efficiency and equity effects of vocationally focused postsecondary education. Sociology of Education, 66, 188-205.

Lynch, L. (1992). Private sector training and the earnings of young workers. American Economic Review, 81(2), 299-312.

Manski, C. (1989). Schooling as experimentation: A reappraisal of the college dropout phenomenon. Economics of Education Review, 8(4), 305-312.

Medrich, E., & Vergun, R. (1994). Earnings and employment outcomes for postsecondary degree holders in vocational subject areas. Berkeley, CA: MPR Associates for the National Assessment of Vocational Education, U.S Department of Education.

Monk-Turner, E. (1983, Summer). Sex, educational differentiation, and occupational status: Analyzing occupational differences for community and four-year college entrants. Sociological Quarterly, 24, 393-404.

Monk-Turner, E. (1990, October). The occupational achievements of community and four-year college entrants. American Sociological Review, 55, 719-725.

Murnane, R., Willett, J., & Boudett, K. P. (1995, Summer). Do high school dropouts benefit from obtaining a GED? Educational Evaluation and Policy Analysis, 17(2), 133-148.

Osterman, P. (1980). Getting started: The youth labor market. Cambridge, MA: MIT Press.

Osterman, P. (1994). How common is workplace transformation and who adopts it? Industrial and Labor Relations Review, 47(2), 173-188.

Pascarella, E., & Terenzini, P. (1991). How college affects students: Findings and insights from twenty years of research. San Francisco, CA: Jossey-Bass.

Pfeiffer, J. (1994). Student follow-up using automated record linkage techniques: Lessons from Florida's education and training placement information program. Journal of Vocational Education Research, 19(3), 93-105.

Pincus, F. (1986). Vocational education: More false promises. In S. Zwerling (Ed.), The community college and its critics. New Directions for Community Colleges (No. 54, pp. 41-51). San Francisco, CA: Jossey-Bass.

Pincus, F. L. (1980, August). The false promises of community colleges: Class conflict and vocational education. Harvard Educational Review, 50(3), 332-361.

Rawlins, V. L., & Ulman, L. (1974). The utilization of college-trained manpower in the United States. In M. Gordon (Ed.), Higher education and the labor market. New York, NY: McGraw-Hill.

Rivera-Batiz, F. (1998, April). A profile and analysis of students in vocational training: Literacy skills, demographics, and socioeconomic characteristics (MDS-809). Berkeley, CA: National Center for Research in Vocational Education.

Rumberger, R. & Thomas, T. (1993). The economic returns to college major, quality, and performance: A multilevel analysis of recent graduates. Economics of Education Review, 12(1), 1-19.

Rumberger, R. (1980). The economic decline of college graduates: Fact or fallacy? Journal of Human Resources, 15, 99-112.

Rumberger, R., & Daymont, T. (1984). The economic value of academic and vocational training acquired in high school. In M. Borus (Ed.), Youth and the labor market: Analyses of the National Longitudinal Survey. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.

Sanchez, J., & Laanan, F. (1997, Winter). The economic returns of a community college education. Community College Review, 25(3), 73-76.

Sanchez, J., & Laanan, F. (1998, May). Assessing the post-college earnings of students: Benefits of attending California community colleges—methods, analysis, and implications. Costa Mesa, CA: Coast Community College District, Vocational Education and Institutional Research.

Seppanen, L. (1995). Linkages to the world of employment. In P. T. Ewell (Ed.), Student tracking: New techniques, new demands. New Directions for Institutional Research (No. 87, pp. 77-91). San Francisco, CA: Jossey-Bass.

Seppanen, L. (1998, Winter). Translating data into useful information and knowledge. In J. Sanchez & F. Laanan (Eds.), Determining the economic benefits of attending community college. New Directions for Community Colleges (No. 104, pp. 29-40). San Francisco, CA: Jossey-Bass.

Seppanen, L., & Bodeutsch, G. (undated). Outcomes and impacts from the first two years of the Timber Retraining Benefits (TRB) program. Olympia, WA: Washington State Board for Community and Technical Colleges.

Sheldon, M. S. (1982). Statewide longitudinal study: Report on academic year 1978-81 (Pt. 5, Final Report). Woodland Hills, CA: Los Angeles Pierce College. (ERIC Document ED 217 917)

Silvestri, G. (1993). Occupational employment: Wide variations in growth. Monthly Labor Review, 116, 58-86.

Smart, J., & Ethington, C. (1985). Early career outcomes of baccalaureate recipients: A study of native four-year and transfer two-year college students. Review of Higher Education, 22(2), 185-193.

Spence, M. (1974). Market signaling. Cambridge, MA: Harvard University Press.

Spetz, J. (1994, February). Compensation for nursing: Is the baccalaureate better? Palo Alto, CA: Department of Economics, Stanford University.

Stern, D. (1992). Economic returns to non-baccalaureate education and training for postsecondary students and adults. Berkeley, CA: School of Education, University of California for the Committee on Postsecondary Education and Training for the Workplace, National Research Council.

Stevens, D., and Chi, J. (1996, September). New perspectives on documenting employment and earnings outcomes in vocational education (MDS-743). Berkeley, CA: National Center for Research in Vocational Education.

Surette, B. (1997, June). The effects of two-year college on the labor market and schooling experiences of young men. (Working paper, Finance and Economics Series). Washington, DC: Federal Reserve Board.

Surette, B. (1999). The transfer role of two-year colleges: Gender differences in the effects of two-year college attendance on four-year college attendance. Unpublished Paper. Washington, DC: Federal Reserve Bank.

Texas State Occupational Information Coordinating Committee. (1998, July). Automated student and adult learner follow-up system, Final Report 1997. Austin, TX: Texas SOICC.

Tuma, J. (1993, April). Patterns of enrollment in postsecondary vocational and academic education. Berkeley, CA: MPR Associates for the National Assessment of Vocational Education.

U.S. Department of Labor. (1995). What's working (and what's not): A summary of research on the economic impact of employment and training programs. Washington, DC: Author.

Vanderheyden, B. (1994, May). First year earnings of public postsecondary education completers (Research Brief No. 1994-05). Raleigh, NC: Planning and Research Section, Department of Community Colleges.

Washington State Board for Community and Technical Colleges. (1992, November). Findings from three years data match for vocational follow-up. Olympia, WA: Author.

Washington State Board for Community and Technical Colleges (1994, September). Job placement rates for graduates of Washington community and technical college vocational programs. Olympia, WA: Author.

Washington State Board for Community and Technical Colleges. (1997, June). Access and success for system goals for people of color in Washington community and technical colleges: Fourth annual progress report. (Research Report 97-4). Olympia, WA: Author.

Whitaker, D., & Pascarella, E. (1994). Two-year college attendance and socioeconomic attainment. Journal of Higher Education, 65 (2), 194-210.

Wills, J. L. (1993). Industry-driven skill standards systems in the United States (Vol. 3). Washington, DC: Institute for Educational Leadership, Center for Workforce Development.

Wilms, W. W. (1974). Public and proprietary vocational training: A study of effectiveness. Berkeley, CA: Center for Research and Development in Higher Education, University of California.

Wilms, W. W., & Hansell, S. (1982, Spring). The dubious promise of postsecondary vocational education: Its payoff to dropouts and graduates in the USA. International Journal of Educational Development, 2(1), 43-59.

Wolpin, K. (1977). Education and screening. American Economic Review, 67(5), 848-958.

Workforce Training and Education Coordinating Board. (1997). Workforce training results: An evaluation of Washington State's Workforce Training System, Second Edition. Olympia, WA: Author.

Yang, X., & Brown, S. K. (1998, May). Using unemployment insurance data and job record data to track the employment and earnings of community college students. Paper presented at the Association for Institutional Research, Minneapolis. Raleigh, NC: Planning and Research, North Carolina Community College System Office.

Zwerling, L. S. (1976). Second best: The crisis of the community college. New York, NY: McGraw-Hill.

APPENDIX

Table 1: Trends in the national labor market, 1967-1996

	1967	1972	1977	1982	1987	1990	1992	1996
Proportion of the labor force:								
Less than high school	39.0%	31.2%	25.6%	19.5%	17.3%	15.5%	13.8%	12.9%
High school diploma	36.3	39.6	39.8	40.5	40.0	39.4	34.2	32.7
Some college	13.1	15.5	18.0	19.8	20.8	22.1	28.3	27.3
College graduate	11.6	13.7	16.6	20.2	21.8	23.0	23.7	27.2
Earnings ratios: Males								
Baccalaureate/high school	1.439	1.472	1.476	1.577	1.630	1.717	1.713	1.685
Associate degree/High school								1.284
Some college/high school	.972	.772	1.010	1.049	1.109	1.160	1.112	1.136
High school dropout/high school	.760	.735	.680	.656	.639	.619	.582	.643
Earnings ratios: Females								
Baccalaureate/high school	1.541	1.496	1.411	1.445	1.591	1.686	1.683	1.752
Associate degree/High school								1.386
Some college/high school	.985	.971	1.039	1.076	1.163	1.156	1.131	1.167
High school dropout/high school	.694	.680	.651	.620	.590	.606	.583	.649

Source: Current Population Survey data analyzed in Grubb and Wilson (1992), and updated

Table 2: Effects of baccalaureate degrees on employment outcomes

Source and data set	Dependent variable	Results	
Kane and Rouse (1995b)	Annual earnings	.281* M	.390* W
NLS 72		(.025)	(.030)
High school class of 1972			
as of 1986	Wages	.229* M	.284* W
		(.022)	(.019)
Hollenbeck (1993)	Wages	.223* M	.223* W
NLS 72		(.038)	(.060)
High school class of 1972			
as of 1986			
Grubb (1995c)	Annual earnings, 1985	.096* M	.126* W
NLS 72		(.014)	(.022)
High school class of 1972			
as of 1986	Wages, 1986	.069* M	.098* W
		(.011)	(.011)
Grubb (1995b)	Annual earnings	.437* M	.428* W
SIPP, 1990		(.019)	(.026)
Individuals 25-64			
Rivera-Batiz (1998)	Wages	.209* M	.306* W
NALS		(.053)	(.058)
Individuals 18+			
	Earnings	.242* M	.333* W
		(.063)	(.071)
Kane and Rouse (1995b)	Annual earnings	.422* M	.513* W
NLS-Youth		(.041)	(.046)
	Wages	.338* M	.331* W
		(.030)	(.031)

Surette (1997) NLS – Youth Men 18-30	Wages (OLS)	.228* M (.043)	
	Wages (discrete factor method)	.404* M	
Leigh and Gill (1997) NLS-Youth Men and women age 28 – 35	Wages	.331* M (.029)	.336* W (.028)
	Earnings	.440* M (.044)	.407* W (.051)
Surette (1999) NLS – Youth Men and women 18-29	Wages	.360* M	.491* W
	Earnings	.664* M	.794* W
Groot, Oosterbeck, and Stern (1995) NLS-Youth	Wages	.401* M (.039)	.480* W (.036)
	Baccalaureate degree, did not attend two-year college:		
Averett and D'Allesandro (forthcoming) NLS-Youth Men and women 28-35	Wages		
	White	.363* M (.039)	.422* W (.042)
	Black	.389* M (.069)	.416* W (.066)
	Earnings		
	White	.534* M (.050)	.440* W (.067)
	Black	.628* M (.133)	.522* W (.110)
	Baccalaureate degree, attended two-year college:		

Wages			
	White	.314* M (.048)	.436* W (.050)
	Black	.528* M (.085)	.410* W (.092)
Earnings			
	White	.392* M (.062)	.449* W (.079)
	Black	.732* M (.139)	.447* W (.153)

*Significant at 5%, two-tailed test.

Other independent variables:

Grubb (1995b)	Race/ethnicity (7), 3 experience measures plus squared terms, still in school, union, metro area, regional dummies (3), married, children, disability, dummies for imputed values.
Grubb (1995c)	Race/ethnicity (4), 3 experience variables plus squared terms, SES, family income (4), HS test scores, HS grades (5), dummies for missing data, dummies for education after 1979.
Kane and Rouse (1995b) NLS 72	Race/ethnicity, parental income, HS rank, HS test scores, experience, experience squared, regional dummies, size of city in HS, part-time employment, HS region, dummies for education after 1979.
Kane and Rouse (1995b) NLS-Youth	Race/ethnicity, region and urban area, part-time, parental education, AFQT score, experience, missing data dummies.
Groot, Oosterbeck, and Stern (1995)	Race/ethnicity, experience post-school, experience in school, AFQT.
Grubb (unpublished)	Race/ethnicity (7), experience, experience squared, age (7), marital status (3), city and rural residence.

Lewis, Hearn, and Zilbert (1993)	Black, female, disability, SES, HS voc ed, ability score, still in school, homemaker, currently unemployed.
Rivera-Batiz (1998)	Experience, experience squared, prose and quantitative scores, mother and father's education, race/ ethnicity, selection correction.
Leigh and Gill (1997)	Race/ethnicity, age, weeks worked (and squared term), AFQT score, region, urban/rural, part-time employment.
Surette (1997)	Race/ ethnicity, labor market experience (linear and quadratic), parental education, age (linear and quadratic), local unemployment rate, urban area, AFQT test score, time trend.
Surette (1999)	AFQT score, experience, age and age squared, local unemployment rate, time trend, race/ ethnicity, urban location, marital status, presence of young children.
Averett and D'Allesandro (forthcoming)	Experience, age, region, AFQT score, children, mental status, parental education, regional unemployment rate, union status, government job (unpublished results from Model 3).

Table 3: Effects of Associate degrees on employment outcomes

Source and data set	Dependent variable	Results
Kane and Rouse (1995b) NLS 72 High school class of 1972 as of 1986	Annual earnings	.073 M .256* W (.046) (.050)
	Wages	.041 M .233* W (.041) (.032)
Hollenbeck (1993) NLS 72 High school class of 1972 as of 1986	Wages	Vocational certificate or Associate degree: -.006 M .113* W (.018) (.048)
Grubb (1995c) NLS 72 High school class of 1972 as of 1986	Annual earnings, 1985	Vocational: .002 M .092* W (.020) (.031)
		Academic: -.037 M .027 W (.026) (.044)
	Wages, 1986	Vocational: -.014 M .068* W (.016) (.015)
		Academic: -.015 M .011 W (.020) (.021)
Grubb (1995b) SIPP, 1990 Individuals 25-64	Annual earnings	.166* M .205* W (.030) (.037)
Rivera-Batiz (1998) NALS Individuals 18+	Wages	.007 M .140* W (.059) (.062)
	Earnings	.063 M .200* W (.072) (.076)

Kane and Rouse (1995) NLS-Youth	Annual earnings	.256* M (.054)	.309* W (.054)
	Wages	.207* M (.040)	.188* W (.036)
Leigh and Gill (1997) NLS-Youth Individuals 28-35	Wages	.200* M (.036)	.243* W (.031)
	Earnings	.218* M (.055)	.253* W (.057)
Surette (1997) NLS – Youth Men 18-30	Wages (OLS)	.122* (.061)	
	Wages (discrete factor method)	.275*	
Surette (1999) NLS – Youth Men and Women 18-29	Wages	.190* M	.206* W
	Earnings	.297* M	.366* W
Averett and D'Allesandro (forthcoming)	Wages		
	White	.181* M (.043)	.224* W (.043)
	Black	.176* M (.074)	.322* W (.063)
	Earnings		
	White	.265* M (.057)	.123 W (.068)
	Black	.332* M (.122)	.179 W (.104)
Groot, Oosterbeck, and Stern (1995) NLS-Youth	Wages	.281* M (.044)	.347* W (.037)

Grubb (unpublished) CPS data, 1993 Individuals 17+	Annual earnings, 1993	Vocational: .264* M .415* W (.026) (.029) Academic: .325* M .416* W (.030) (.032)

* Significant at 5%, two-tailed test.
For other independent variables included, see Table 2.

Table 4: Effects of certificates on employment outcomes

Source and data set	Dependent variable	Results
Grubb (1995b) SIPP, 1990 Individuals 25-64	Annual earnings	.063 M .219* W (.042) (.044)
Grubb (1995c) NLS 72 High school class of 1972 (as of 1986)	Annual earnings, 1985	-.029 M -.046 W (.026) (.037)
	Wages, 1986	.002 M .027 W (.021) (.018)
Hollenbeck (1993) NLS 72 High school class of 1972 (as of 1986)	Wages	-.049 M .052 W (.054) (.066)
Rivera-Batiz (1998) NALS Individuals 18+	Wages	-.004 M .008 W (.056) (.059)
	Earnings	-.062 M .059 W (.058) (.072)
Surette (1997) NLS – Youth Men 18-30	Wages (discrete factor method)	.050* M (.018) (completed vocational training)

* Significant at 5%, two-tailed test.
For other independent variables included, see Table 2.

Table 5: Effects of postsecondary education without credentials on employment outcomes

	Dependent variable	Results
Grubb (1995b) SIPP, 1990 Individuals 25-64	Annual earnings	2 years: .069* M .200* W (.028) (.039) 1 year: .093* M .059 W (.029) (.036) <1 year: .072 M .030 W (.040) (.049)
Grubb (1995c) NLS 72 High school class of 1972 as of 1986	Annual earnings, 1985	Vocational credits, CC: .0013* M .0006 W (.0006) (.0015) Academic credits, CC: .0005 M .0001 W (.0004) (.0008) Vocational credits, 4-year: .0024* M .0008 W (.0004) (.0008) Academic credits, 4-year: -.0007 M .0006 W (.0003) (.0004)
	Wages, 1986	Vocational credits, CC: .0011* M -.0004 W (.0005) (.0007) Academic credits, CC: -.0002 M .0016* W (.0003) (.0004)

		Vocational credits, 4-year: .0009* M .0016* W (.0003) (.0004) Academic credits, 4-year: -.0003 M -.0001 W (.0002) (.0002)
Kane and Rouse (1995b) NLS 72 High school class of 1972 as of 1986	Annual earnings	CC credits/(30): .057* M .066* W (.019) (.026) 4-year credits/(30): .026 M .101* W (.015) (.020)
	Wages	CC credits/(30): .041* M .058* W (.011) (.017) 4-year credits/(30): .002 M .068* W (.013) (.013)
Hollenbeck (1993) NLS 72 High school class of 1972 as of 1986	Wages	Attended post-secondary voc: -.251* M -.150 W (.074) (.118) Months attended: .004* M .001 W (.002) (.001)
Kane and Rouse (1995b) NLS-Youth	Annual earnings	Voc school only: .073 M .110* W (.038) (.045) CC only: .071 M .132* W (.040) (.044)

		4-year only: .160* M .087 W (.047) (.054) CC and 4-year: .134* M .127* W (.054) (.058)
	Wages	Voc school only: .042 M .004 W (.028) (.029) CC only: .076 M .036 W (.030) (.029) 4-year only: .083* M .031 W (.035) (.035) CC and 4-year: .088* M .054 W (.040) (.039)
Rivera-Batiz (1998) NALS Individuals 18+	Wages	<2 years post-secondary -.033 M -.025 W (.053) (.057) <4 years college .024 M .153* W (.055) (.060)
	Earnings	<2 years post-secondary -.040 M -.017 W (.064) (.069) <4 years college -.030 M .130 W (.067) (.073)

Leigh and Gill (1997) NLS-Youth Individuals 28-35	Wages	2-year college, no cred. .102* M .057* W (.027) (.025) 4-year college, no cred. .103* M .073* W (.031) (.028)
	Earnings	2-year college, no cred. .189* M .044 W (.041) (.046) 4-year college, no cred. .175* M .007 W (.047) (.052)
Surette (1997) NLS – Youth Men 18-30	Wages (OLS)	Attended 2-year college, no degree .098* M (.046) Attended 4-year college, no degree .042 M (.048)
	Wages (discrete factor method)	2-year credits (30) squared term .118* M -.011 (.030) (.010) 4-year credits (30) squared term .089* M -.012 (.018) (.003)
Surette (1999) NLS – Youth Men and Women 18-29	Wages	2-year credits (30) .049* M .068* W (.014) (.013)

		4-year credits (30) .031* M .061* W (.009) (.009)
	Earnings	2-year credits (30) .114* M .118* W (.018) (.018)
		4-year credits (30) .069* M .111* W (.013) (.013)
Groot, Oosterbeck, and Stern (1995) NLS-Youth	Wages	< 2 years college: .088* M .093* W (.026) (.024)
		2-4 years: .075 M .199* W (.053) (.049)
Grubb (unpublished) CPS data, 1993 Individuals 17+	Annual earnings, 1993	Some college: .049* M .110* W (.013) (.016)
Lewis, Hearn, and Zilbert (1993): HS&B, 5 years after high school Those not attending a 4-year college	Earnings	Participated in postsecondary voc ed. (completers and noncompleters): .19* All .41* W (.076) (.111)
		.37* Low SES (.132)
Averett and D'Allesandro (forthcoming) NLS-Youth Men and Women age 28-35	Attended two-year college only, no degree:	

Wages			
	White	.060 M	.104* W
		(.034)	(.045)
	Black	.165* M	.181* W
		(.052)	(.051)
Earnings			
	White	.147* M	.120* W
		(.045)	(.055)
	Black	.206* M	.080 W
		(.086)	(.084)

Attended four-year college only, no degree:

Wages			
	White	.078	.149* W
		(.042)	(.045)
	Black	.090	.201* W
		(.054)	(.056)
Earnings			
	White	.101	.040
		(.055)	(.071)
	Black	.368* M	.278* W
		(.089)	(.084)

Attended both two- and four-year colleges, no degree:

Wages			
	White	.105* M	.114* W
		(.046)	(.050)
	Black	.174* M	.173* W
		(.068)	(.062)
Earnings		.236* M	.161* W
	White	(.059)	(.079)
	Black	.274* M	.130 W
		(.112)	(.103)

* Significant at 5%, two-tailed test.
For other independent variables included, see Table 2.

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Table 6: Effects of postsecondary credentials, by field of study: 1987

	Men	Women
Certificates:		
Business	.071	.139
	(.244)	(.213)
	8	19
Education	—	.621
		(.654)
		2
Engineering/computers	.384	-.974
	(.282)	(.655)
	6	2
Health	.307	.286*
	(.308)	(.102)
	5	87
Public service	.270	-.907
	(.262)	(.656)
	7	2
Vocational/technical	.101	.074
	(.087)	(.139)
	65	46
Other	.187	.133
	(.218)	(.293)
	10	10
Associate degrees:		
Business	.113	.375*
	(.082)	(.112)
	73	71
Education	.286	-.225
	(.397)	(.231)
	3	16

Engineering/computers	.359* (.098) 51	.299 (.377) 6
Health	.093 (.218) 10	.369* (.102) 87
Public Service	.444* (.193) 13	.829 (.464) 4
Vocational/technical	.211* (.092) 58	-.335 (.249) 14
Other vocational	.355 (.209) 11	.462 (.462) 4
Math/science	-.047 (.208) 11	.352 (.378) 6
Humanities	.117 (.145) 23	.005 (.145) 42
Social Sciences	.326 (.209) 11	-.103 (.249) 14
Other	.232 (.122) 32	.373* (.177) 28
<u>Baccalaureate degrees:</u> Business	.503* (.046)	.509* (.096)

	269	100
Education	.126 (.091) 61	.153* (.068) 226
Engineering/computers	.652* (.058) 164	.838* (.250) 14
Health	.308* (.173) 16	.445* (.103) 86
Public Service	.247 (.168) 17	-.314 (.353) 7
Vocational/technical	.411 (.244) 8	-.126 (.532) 3
Other vocational	.343* (.108) 42	.136 (.142) 44
Math/science	.314* (.081) 75	.572* (.127) 56
Humanities	.166* (.068) 112	.226* (.090) 118
Social Sciences	.320* (.064) 128	.513* (.102) 88
Other	.276* (.096)	.141 (.146)

	53	42
R^2	.3912	.3672
N	5452	4952

Source: Survey of Income and Program Participation, 1990. Asterisks denote significance at 5%. Standard errors are in parentheses, and the number below that reports the number of individuals with that credential.

Table 7: Proportion of individuals in vocational areas with related employment, 1990

	Males	Females
B.A. /B.S.	61.9%	61.2%
Associate	47.2	63.0
Certificate	55.3	55.3
Some college, no credential:		
4 years	39.4	52.6
3 years	44.1	43.2
2 years	45.4	44.9
1 year	35.2	50.2
<1 year	33.5	44.1

Individuals with unknown relatedness of employment and with academic credentials are not included in these calculations.

Source: Grubb (1997).

Table 8: Effects of postsecondary education on annual earnings, for related and unrelated employment: Males, 1990

	Related Employment	Unrelated Employment	Relationship Unknown	Academic Field
B.A./B.S.	.524*	.365*	.449*	.388*
	(.027)	(.033)	(.056)	(.029)
Associate	.248*	.105*	.106	.174*
	(.051)	(.048)	(.091)	(.063)
Certificate	.039	.113	-.018	—
	(.059)	(.065)	(.144)	
Some college, no credential:				
4 years	.642*	.256*	.098	.240*
	(.127)	(.105)	(.186)	(.114)
3 years	.305*	.139*	.240	.153
	(.079)	(.071)	(.172)	(.081)
2 years	.201*	-.022	.013	.064
	(.048)	(.044)	(.081)	(.052)
1 year	.228*	.069	-.036	.056
	(.057)	(.043)	(.084)	(.057)
<1 year	.150	.033	.051	.085
	(.084)	(.060)	(.106)	(.080)

N = 10,601, R^2 = .412

*Significant at 5%, conventional 2-tailed test. Standard errors are in parentheses.
Source: Grubb (1997).

Table 9: Effects of postsecondary education on annual earnings, for related and unrelated employment: Females, 1990

	Related Employment	Unrelated Employment	Relationship Unknown	Academic Field
B.A./B.S.	.594*	.231*	.425*	.396*
	(.039)	(.047)	(.090)	(.038)
Associate	.387*	-.034	-.073	.231*
	(.053)	(.068)	(.122)	(.080)
Certificate	.348*	.083	.088	—
	(.060)	(.066)	(.170)	
Some college, no credential:				
4 years	.522*	.322	.545	.334
	(.187)	(.197)	(.587)	(.179)
3 years	.190	.179	.269	-.177
	(.117)	(.103)	(.209)	(.110)
2 years	.342*	.084	.095	.212*
	(.068)	(.062)	(.141)	(.070)
1 year	.118*	-.044	.195	.063
	(.058)	(.058)	(.116)	(.066)
<1 year	.166	-.170*	.129	.138
	(.086)	(.077)	(.158)	(.099)

N = 9940, R^2 = .394

*Significant at 5%, conventional 2-tailed test. Standard errors are in parentheses.
Source: Grubb (1997).

Table 10: Earnings premium over high school graduates by age, NLS - youth data

Age	Two-Year College, No Credential	Associate Degree	Four-Year College, No Degree	B.A./B.S.
23	6.0%	11.7%	12.0%	48.3%
26	8.3	19.9	13.3	63.7
29	10.9	28.5	15.7	80.4

Source: Surette (1997), Figure 4.2; figures provided by author.

Table 11: Occupations and Employment by Levels of Education, 1990

	Level of Education								
	Ph.D.	Prof.	M.A.	B.A.	Assoc.	Voc. Cert.	Some College	High School	H. S. Dropout
Occupation									
Managerial	15.2%	4.9%	19.3%	20.0%	16.0%	8.2%	12.9%	8.0%	2.8%
Professional	69.6	82.7	64.4	40.6	18.9	19.8	7.1	3.6	0.7
Technical	8.7	3.7	2.2	5.5	7.9	10.9	3.8	2.2	0.9
Sales/clerical	6.5	4.9	11.7	25.7	40.4	38.5	53.0	49.5	10.6
Service	0	3.7	1.9	5.9	12.0	16.7	16.3	20.9	40.5
Mechanic/precision production	0	0	0.3	0.7	1.2	1.4	1.4	3.0	3.5
Machine operator	0	0	0.2	0.6	1.9	3.1	2.8	8.3	20.4
Other*	0	0	0	1.0	1.7	1.4	2.3	4.3	7.3
Employment									
Weeks spent on layoff or looking for work	0.5	0.6	0.7	1.2	1.4	1.4	1.9	2.6	4.3
Proportion unemployed, May 1990	0.2%	0.9%	1.2%	1.8%	2.7%	1.4%	3.2%	3.7%	4.1%
Earnings variation over 1990	.35	.36	.37	.43	.43	.43	.58	.52	.70

*The "other" category includes laborers; farm, forestry, and fishery workers; construction workers; and transportation workers. Totals do not sum to 100% because of round-off error and the omission of Armed Forces. The row labeled "earnings variation" is the coefficient of variation (the standard deviation divided by the mean) over 12 months of earnings.
Source: Survey of Income and Program Participation, 1990.

Table 12: Levels of literacy by levels of schooling

Education	Quant. Lit. Score	Prose Lit. Score	Document Lit. Score
0-8 years	169	177	170
9-11 years	227	231	227
GED	268	268	264
HS diploma	270	270	264
Some college, no credential	295	294	290
Associate degree	307	308	299
B.A./ B.S.	322	322	314
Graduate studies	334	336	326

The three scales have a range of 200 to 500, with scores in the range of 200 to 275 considered the lowest level of literacy.
Source: Kirsch, Jungeblut, Jenkins, and Kolstad (1993), Tables 1.2A, 1.2B, 1.2C.

Table 13: Employment and earnings, Santa Barbara and Grossmont Community Colleges

	Earnings, year prior to leaving college	First year after college:		Third year after college:	
Educational attainment		% working 4 quarters:	Earnings:	% working 4 quarters:	Earnings:
Associate Degree	$8,545	63%	$18,443	71%	$26,078
Certificate	$6,426	69%	18,914	76%	21,729
12+ units, no credential	$8,479	62%	16,080	67%	20,519
Degree completers:					
Economically disadvantaged	$7,055	67%	21,802	73%	27,645
Not disadvantaged	12,023	76%	25,026	78%	29,182
12+ units, no degree:					
Economically Disadvantaged	8,357	54%	17,989	56%	22,554
Not disadvantaged	16,634	67%	21,942	73%	25,599

Source: Friedlander (1993).

Table 14: Employment and earnings by major field, Santa Barbara and Grossmont Community Colleges

Major field	First year out: Worked 4 quarters:	First year out: Earnings:	Third year out: Worked 4 quarters:	Third year out: Earnings:
Admin. of Justice	80%	$17,941	86%	$26,505
Business	65%	20,674	73%	25,823
Computer Science	72%	22,591	77%	28,271
Drafting/CAD	100%	24,796	67%	28,360
Electronics	69%	29,131	75%	31,990
Graphic Arts	60%	14,145	67%	24,969
Marine Technology	55%	22,618	70%	24,595
Nursing	87%	30,564	86%	33,760
OIS	88%	20,700	82%	24,311
Radiology	84%	28,313	78%	31,065
Restaurant Management (2-year certificate)	68%	18,356	71%	22,479

Source: Friedlander (1993).

Table 15: Earnings and Employment of Community College Students in California

	Last year in college:			Third year out of college:			
	% in UI file	% worked 4 quarters	Median earnings ($)	% in UI file	% worked 4 quarters	Median earnings($)	Percent increase
All exiters	70.1	69.0	23,070	60.5	64.9	25,935	12.4
Men	72.7	68.4	26,401	62.4	64.7	29,543	11.9
Women	69.3	69.7	20,969	60.1	65.1	23,512	12.1
White	71.6	70.4	24,704	60.2	65.7	27,977	13.2
Asian	62.1	65.5	23,623	56.8	65.4	26,889	13.8
Black	68.9	63.2	23,303	60.8	58.4	23,939	2.7
Hispanic	74.4	68.2	18,461	66.6	64.6	21,173	14.7
Other non-white	74.8	70.7	22,531	66.4	67.0	26,012	15.4
18-24	75.7	59.6	12,356	62.8	60.1	18,424	49.1
25-34	75.1	68.3	26,426	64.8	62.2	29,368	11.1
35 and over	61.5	81.2	33,508	54.9	73.5	32,997	-1.5
Non credit	63.2	61.9	19,521	53.5	60.6	21,846	11.9
0-12 credits	71.7	71.6	26,397	62.1	66.3	28,451	7.8
12-24 credits	74.4	71.1	22,658	63.9	66.1	25,713	13.5
24+ credits	74.7	72.4	21,791	65.1	66.5	26,027	19.4
Certificate	75.5	67.2	22,086	70.5	68.6	28,563	29.3
AA/AS degree	74.6	68.8	17,832	68.0	67.3	27,522	54.3

Academic disadvantage	70.8	62.7	15,544	62.1	60.5	19,155	23.2
No academic disadvantage	69.9	70.9	25,529	60.0	66.2	28,367	11.1
Economically disadvantaged	55.4	42.2	10,609	52.3	51.9	15,910	50.0
Not economically disadvantaged	70.8	70.0	23,385	60.9	65.4	26,318	12.5
LEP	55.7	59.8	14,933	48.4	62.5	16,845	12.8
Not LEP	71.0	69.5	23,646	61.3	65.0	26,574	12.4
Disabled	43.8	47.0	12,246	38.4	53.6	16,523	34.9
Not disabled	70.5	69.2	23,139	60.8	65.0	26,004	12.3

Source: Effectiveness of California Community Colleges (1997).

Table 16: Effects of community colleges in Washington, 1993-94 participants

	Short-Term Net Impacts (7 to 9 Months After Training at Community and Technical Colleges)			Long-Term Net Impacts (3 Years After Training at Community and Technical Colleges)		
	Comparison Group	Participants (Adjusted)	Net Impact	Comparison Group	Participants (Adjusted)	Net Impact
Percent employed	63.4%	68.6%	5.2%	60.2%	67.9%	7.7%
Mean hourly wages	$ 9.90	$11.10	$ 1.20	$11.09	$13.06	$ 1.97
Mean hours worked per quarter	366	400	34	403	429	26
Mean quarterly earnings	$3,705	$4,537	$ 832	$4,556	$5,618	$1,062
Percent receiving unemployment insurance				8.3%	5.7%	-2.6%
Percent receiving AFDC	5.2%	6.5%	1.3%	4.2%	3.6%	-.6%
Percent receiving food stamps	14.0%	14.2%	.2%	11.3%	8.9%	-2.4%
Percent receiving medical benefits	13.2%	16.3%	3.1%	11.0%	8.7%	-2.3%

Source: Workforce Training and Education Coordinating Board (1997), Figures 14 and 15.

Table 17: Job preparatory students

Relationship of pre-college wages to post-college wages by higher, middle, and lower wage occupational groups

	Median Wage in $ 1997				Median Credits Taken	
	Pre-College	Post-College	Gain	% Gain	Vocational	Total
Higher Wage						
Graduates	$10.22	$13.70	$ 3.48	34%	82	105
Leavers	$11.20	$12.50	$ 1.30	12%	39	44
Early Leavers	$10.17	$11.46	$ 1.29	13%	7	10
Middle Wage						
Graduates	$ 9.11	$10.57	$ 1.46	16%	74	102
Leavers	$ 8.89	$10.37	$ 1.48	17%	38	48
Early Leavers	$ 9.55	$10.79	$ 1.24	13%	5	10
Lower Wage						
Graduates	$ 7.50	$ 8.74	$ 1.24	17%	67	88
Leavers	$ 7.89	$ 8.84	$ 0.95	12%	36	42
50+ Voc Credits	$ 7.91	$ 9.11	$ 1.20	15%	75	86
30-49 Voc Credits	$ 7.68	$ 8.65	$ 0.97	13%	38	45
10-29 Voc Credits	$ 7.93	$ 8.77	$ 0.84	11%	18	22
Early Leavers	$ 7.70	$ 8.84	$ 1.14	15%	6	10
Early Leavers	$ 8.99	$10.18	$ 1.19	13%	6	10
No Credits Earned	$ 8.11	$ 9.50	$ 1.39	17%	12	15

Source: Loretta Seppanen, Washington State Board for Community and Technical Colleges, informal communication.

Table 18: Quarterly earnings of 1990-91 Florida cohort

	Original Cohort 4th Qtr, 1991	"Apples" (not advanced) 4th Qtr, 1995	"Apples and Oranges" (all) 4th Qtr, 1995
HS Dropouts	$3,349	$4,020	$4,020
HS Graduates	$2,960	$4,296	$4,291
District PS Voc	$4,585	$5,864	$5,680
CC Adult Voc	$5,063	$6,100	$5,927
CC Voc Credits	$5,974	$7,613	$7,269
CC-AS	$6,800	$8,555	$8,387
CC-AA	$4,656	$6,724	$6,024
BA	$5,731	$8,418	$7,712
Master's	$8,086	$10,573	$9,868

Source: Lanham and Whitfield (1997), Table 7.

Table 19: Experience with welfare and corrections, Florida cohort, Fall 1995

	Receiving Welfare	Involved with Dept. of Corrections
HS Dropouts	23.4%	8.1%
GED	18.2%	12.7%
HS Voc	8.6%	1.6%
HS Graduate	7.4%	1.8%
District PS Voc	9.5%	1.4%
CC Adult Voc	8.6%	1.4%
CC Voc Credits	1.9%	0.9%
CC-AS	1.3%	0.3%
CC-AA	1.7%	0.5%
BA	0.4%	0.2%
Master's	0.3%	0.2%

Source: Lanham and Whitfield (1997), Table 4.

Table 20: Community/ Technical Colleges Leavers vs. Graduates Average 4th Quarter Earnings

Major		Working Only: %	Working Only: Average Quarterly Earnings	Working & Pursue Higher Education: %	Working & Pursue Higher Education: Average Quarterly Earnings	Number
Academic	Leavers	69.3%	$4,707	30.7%	$2,524	148,333
	Graduates	44.7%	$5,295	55.3%	$3,319	5,775
Technical	Leavers	85.4%	$5,222	14.6%	$3,511	78,494
	Graduates	83.1%	$5,655	16.9%	$4,686	13,684
Tech. Prep.	Leavers	82.5%	$5,229	17.5%	$3,891	22,629
	Graduates	81.2%	$6,105	18.8%	$4,861	4,311
Total	Leavers	75.6%	$4, 892	24.4%	$2,700	249,456
	Graduates	73.4%	$5,692	26.6%	$4,018	23,770

Source: Texas SOICC (1998), Table 1.

Table 21: Earnings by credentials completed and age, North Carolina, 1991 completers

	Age				
	21-24	25-29	30-34	35-39	40+
Degree completed					
Certificate	$17,578	$20,076	$22,910	$22,306	$23,125
Diploma	$19,100	$21,414	$22,945	$22,903	$21,537
AAS	$19,996	$23,649	$26,300	$26,781	$26,383
BA/BS	$20,569	$22,763	$26,675	$28,554	$31,034
MA/MS	$25,188	$27,943	$33,245	$39,572	$33,582

Source: Vanderheyden (1994).

Table 22: Mean annual earnings by students' status and age, 1995-96

	Age:			
Status:	<25	25-34	35-44	≥45
Exit Completers	$13,584	$18,267	$21,504	$22,508
Comeback Completers	$10,288	$16,595	$20,535	$20,905
Exit Noncompleters	$11,659	$21,368	$26,739	$30,133
Comeback Noncompleters	$10,438	$19,492	$24,431	$27,070

Source: Yang and Brown (1998), Table 3.

FOOTNOTES

[i] This phrase was first created in the early days of this century (Lapp & Mote, 1915). It remains a favorite slogan of those promoting occupational purposes.

[ii] Some of the other lesser-known corners of the entire education and training system where returns are uncertain include job training, which tends to have very low (and sometimes even negative) returns (Grubb, 1996a; Lalonde, 1995; U.S. Department of Labor, 1995), except perhaps the training provided by firms to their employees (Lynch, 1992; Grubb & Ryan, 1999, Ch. V.4); proprietary schools, which generally have low returns (Grubb, 1994); and the GED (General Equivalence Diploma), which has only a small effect once various other personal characteristics including self-selection are considered (Cameron & Heckman, 1993; Murnane, Willette, & Boudett, 1995). Thus many non-standard forms of preparation for employment have low and uncertain returns, contradicting the naive version of human capital.

[iii] The BLS projections of educational attainment to 2005 estimate that the group with "some college" will increase only marginally, from 27.2 percent of the labor force to 27.4 percent, while those with high school diplomas will fall slightly from 35.8 percent to 34.9 percent (Silvestri, 1993, Table 9). However, these simulations assume changes in *occupations* but not in *educational attainments* in particular occupations. Given the tendency for educational inflation to take place in specific occupations, the growth in the sub-baccalaureate labor force should be larger than these projections.

[iv] For a census of different industry groups offering their own credentials, see Wills (1993). However, there has been no analysis of how common such credentials are or what their employment effects are.

[v] According to the 1990-91 NPSAS (National Postsecondary Student Aid Survey) data, enrollments in technical institutes or colleges were only 3.3 percent of students in public two-year colleges and 1.4 percent of postsecondary students overall (see Tuma, 1993, Table 2.1). These proportions have been shrinking as states convert technical institutes into community colleges, as Minnesota and South Carolina have done recently; this is part of the general drift in this country toward higher-status academic institutions, clarified in Grubb and McDonnell (1996).

[vi] This section is based on interviews of employers and providers in four local labor markets, reported initially in Grubb, Dickinson, Giordano, and Kaplan (1992) and subsequently in Grubb (1996b, Ch. 1); and interviews with providers of education and training in eight communities in four states, reported in Grubb and McDonnell (1996).

[vii] See, for example, the interview evidence in Grubb (1996b, Ch. 2), and Grubb and Associates (1999, Ch. 1). In addition, logit equations describing enrollment in two- and four-year colleges using the NLS72 data indicate that students who report being unsure of the ability to complete four-year colleges are more likely to attend two-year colleges (see Grubb, 1990).

[viii] On the model for "educational expansion" versus "cooling out" see Grubb (1989c). I summarize the evidence in Grubb (1996b, Ch. 2), and conclude that expansion dominates cooling out.

[ix] Starting from equation (1), d ln Y = b fi ln Y_2 - ln Y_1 = b fi Y_2/Y_1 = exp(b) where the difference between Y_1 and Y_2 describes the effect of the change in education measured by that dummy variable—for example, the influence of earning a baccalaureate degree compared to a high school diploma. Therefore the anti-log of b, minus one, is the percent increase in wages or earnings attributable

to a particular level of schooling. In this review, I will distinguish between coefficients like b, and the transformation exp(b) - 1 that describes the percent increase in earnings.

[x] Brint and Karabel rely on several studies in addition to Pincus (1980). Breneman and Nelson (1981) analyzed the National Longitudinal Study of the Class of 1972; but they examine employment four years after students left high school—too short a period of time for the benefits of postsecondary education to materialize—and their measure of postsecondary education was initial postsecondary attendance in a two- or four-year-year college, not a measure of completion. Work by Monk-Turner (1983; 1990) again compares students from two- and four-year colleges. The research of Wilms (1974) compared the experiences of students in public and proprietary institutions but did not distinguish completion versus non-completion, or the benefits of attending either of these types of institutions relative to earning a high school diploma only. Wilms and Hansell (1982) failed to find earnings significantly increased by either graduation or persistence in either public or proprietary institutions; but the treatment of inflation and experience is awkward.

[xi] See the much more positive findings with the same data set using results when these students were in their early 30s by Kane and Rouse (1995b) and Grubb (1995b).

[xii] Some data sets (NLS72 and HS&B) have collected transcripts from the postsecondary institutions that individuals have attended, rather than relying on self-reports of education attained. Although the transcript-reported results are presumably more accurate than self-reported results, and provide much more information about the courses taken, they are also prone to problems of error and missing data (see especially Adelman, 1990). Comparison of transcript-reported and self-reported education, presented in Grubb (1997), indicates that the

individuals consistently self-report more education than transcripts reveal, with over-reporting larger for those groups known to be less likely to enroll in postsecondary education. This pattern of bias implies that returns to schooling based on transcript data are lower than the returns based on self-reported data.

[xiii] The clear exception is the NLS72 data, where there are significant returns for women but not for men; furthermore, the positive returns for women are due to the vocational Associate degree—which includes the well-paid health occupations—and not the academic Associate degree. This pattern is also true in Rivera-Batiz's NALS data.

[xiv] But see the disagreement between Kane and Rouse (1995b) and me (Grubb 1995d).

[xv] Of all these potential comparisons, the benefits of credentials are higher than the benefits of the equivalent years of college without credentials in 15 out of the 18 cases. To be sure, many of the 15 differences associated with "program effects" are not statistically significant, but the consistent direction of the difference lends support to the idea that there are program effects.

[xvi] It is possible that the amount of postsecondary education reported as two years, for example, is two years part-time and therefore substantially less than is required for an Associate degree.

[xvii] The authors used two comparison groups: non-trainees and dropouts who entered but did not complete these training programs.

[xviii] The SIPP asks respondents to check a box describing the field of study, without any definition of fields or examples, and so some of the fields of study—vocational/technical and "other vocational" in particular—are ambiguous. The results for 1984 and 1990 are substantially identical to those of 1987.

[xix] In some regions of the country, public service includes fire fighters and police prepared through community college programs. Some legal aides and social service workers may be included in this category.

[xx] The vocational/technical fields include the trades and construction crafts, which may explain why the coefficient is positive and significant for men in 1987 but not for women.

[xxi] In community colleges it is usually possible to major in "liberal studies" or "general studies," programs which usually include a series of academic prerequisites for transferring to four-year colleges. I suspect most of the "other" category includes Associate degrees in liberal studies.

[xxii] The academic Associate degree has been declining in importance as a route to transfer, and almost as many students with vocational Associate degrees now transfer as do those with academic Associates (see Grubb, 1991, Table 2).

[xxiii] For evidence that gender segregation has been declining more in higher-level occupations than in middle- and lower-level jobs, see Blau and Ferber (1992).

[xxiv] There is a general consensus that career-oriented counseling has all but vanished from most high schools. While there appear to be more resources in counseling and guidance in community colleges, they still appear to be inadequate relative to the need. Some evidence comes from a series of interviews in community colleges in four local labor markets, reported in Grubb, Dickinson, Giordano, and Kaplan (1992) and Grubb (1996b); other evidence comes from the interviews with students summarized in Grubb (1996b, Ch. 2), and from the testimony of instructors in Grubb and Associates (1999).

[xxv] The matching algorithm was developed by Medrich and Vergun (1994), with a few changes: they did not classify education programs, which I then added; and they matched a category of "other" education with a number of

particular occupations, while I have categorized individuals with "other" education as simply having an unknown match.

[xxvi] These results are consistent with the findings of Wilms (1974), that roughly 50 percent of students found employment related to their field of study, and to the state studies cited by Pincus (1980), reporting a median figure of 60 percent of students in jobs related to their training. In trials using a matching algorithm developed by Rob Meyer for the NLS72 data, I defined employment as related to one's field of study if, arbitrarily, 50 percent or more of courses were related to employment. (This matching algorithm matched *courses* taken, not fields of study, with employment.) With this definition, 38 percent of students with certificates and 33 percent of those with Associate degrees were in related employment (see Grubb, 1989b, Table 16). Differences in the definition of relatedness make comparisons with the SIPP results in Table 7 problematic. What was clear from the NLS72 results is that individuals leaving without credentials and individuals completing fewer courses tended to have fewer courses related to their present employment—indicating that individuals with small amounts of coursework are more likely to be "experimenters" than individuals who know what area of employment they intend to follow.

[xxvii] These coefficient are similar to those usually estimated for high school vocational education, like Rumberger and Daymont, in that they compare the effects of vocational versus academic education at the same level of schooling. In contrast, most postsecondary analyses compare the effects of postsecondary vocational education with those of earning high school diplomas, combining the effects of the *level* of schooling with the *type* of schooling.

[xxviii] In addition, the 1996 Current Population Survey figures indicate that the differences associated with some college and with Associate degrees are present for the 25 to 29 age group.

[xxix] Complex specifications like those of Spetz (1994) for the special case of nursing suggest that differentials by education can vary substantially with age or experience, with early benefits to certain credentials disappearing or reversing themselves over time. One possible answer to Spetz's question about why students continue to enroll in baccalaureate programs when the lifetime earnings are lower may be that they do not understand earnings over longer periods of time.

[xxx] I used a test devised by Wolpin (1977), which depends on looking at the differences between self-employed individuals—who need not signal their abilities to others—and salaried employees, who do need to signal their abilities in order to be hired. The results, based on the NLS72 data, indicate that returns to the vocational Associate degree and to the baccalaureate degree for both men and women (and returns to the academic Associate among women) are higher for salaried individuals than they are for self-employed individuals. These results are consistent with the signaling hypothesis (Grubb, 1995f, Table 5)—though small sample sizes preclude several of these differences from being significant.

[xxxi] In addition, Hollenbeck (1993) stresses the differences among those entering two-year colleges versus four-year colleges and those not going on to postsecondary education, an approach that acknowledges the potential effects of self-selection, or of the signaling value of the initial institution. However, while an F-test confirms the differences among coefficients are significant, the coefficients pertaining directly to sub-baccalaureate education are not especially different. Groot, Osterbeck, and Stern (1995) are most concerned with selection effects, and their sequential probit model implies powerful positive selection effects for the baccalaureate degree and negative effects for sub-baccalaureate education; but these results are incomplete.

[xxxii] See, for example, Baj, Trott, and Stephens (1991); Levesque and Alt (1994); Pfeiffer (1994); Stevens and Chi (1996); Anderberg and Pfeiffer (1998), including the bibliography therein.

[xxxiii] Texas has put some effort into calculating earnings for related and unrelated placements, like the results in Tables 8 and 9. The measurement of "relatedness" was accomplished by linking the sector in which individuals work to patterns of occupations within sectors, and then matching these occupations to program areas (Anderberg & Pfeiffer, 1998, Special Issues Addendum #1). The results seem reasonable, with earnings in related employment about 26 percent higher than those in unrelated employment. However, this matching procedure is fraught with uncertainty, and the authors stress that occupational information collected from employers through follow-up surveys offers a better way of measuring relatedness. Washington used to calculate related placement in this way; the results varied substantially among programs and were lowest for agriculture (58 percent) and service occupations (73 percent) and highest for health-related occupations (91 percent in 1991-92). While these results again seem reasonable and consistent with those from national data, the state does not calculate related placement anymore because of the imprecision of these estimates.

[xxxiv] See especially King et al. (1998). A review of local programs with high reputations, as part of the research for Grubb et al. (1999), indicates that many of these also engage in such targeting.

[xxxv] Results very close to these are published in Sanchez and Laanan (1997) and in Laanan (1998); see also Friedlander (1996). On methodological issues in California, see also Sanchez and Laanan (1998).

[xxxvi] If we take the real earnings of those 18-24 the year before leaving as essentially the earnings of high school graduates, the increase of 49.1 percent is

equivalent to a Mincerian return of .399, relatively higher than most of the coefficients in Tables 3 and 4. However, the variables normally included in earnings functions are not controlled in these results.

[xxxvii] Academic disadvantage is defined as needing remediation, not having graduated from high schools, or requiring tutorial assistance; economic disadvantage includes those eligible for financial aid, GAIN, JTPA, or eligible under the definitions of the Perkins Act.

[xxxviii] The comparison groups are selected from files of Employment Service (ES) registrants. In most states, ES has become a service where employers with low-quality jobs are matched with low-quality workers, particularly those directed from welfare programs to register for employment. The selection of a comparison group is based on a complex method developed by James Heckman and his colleagues, carried out by the Battelle Institute and briefly described in Net Impact Evaluation, Appendix A, "Technical Appendix," available from the Washington State Workforce Training and Education Coordination Board.

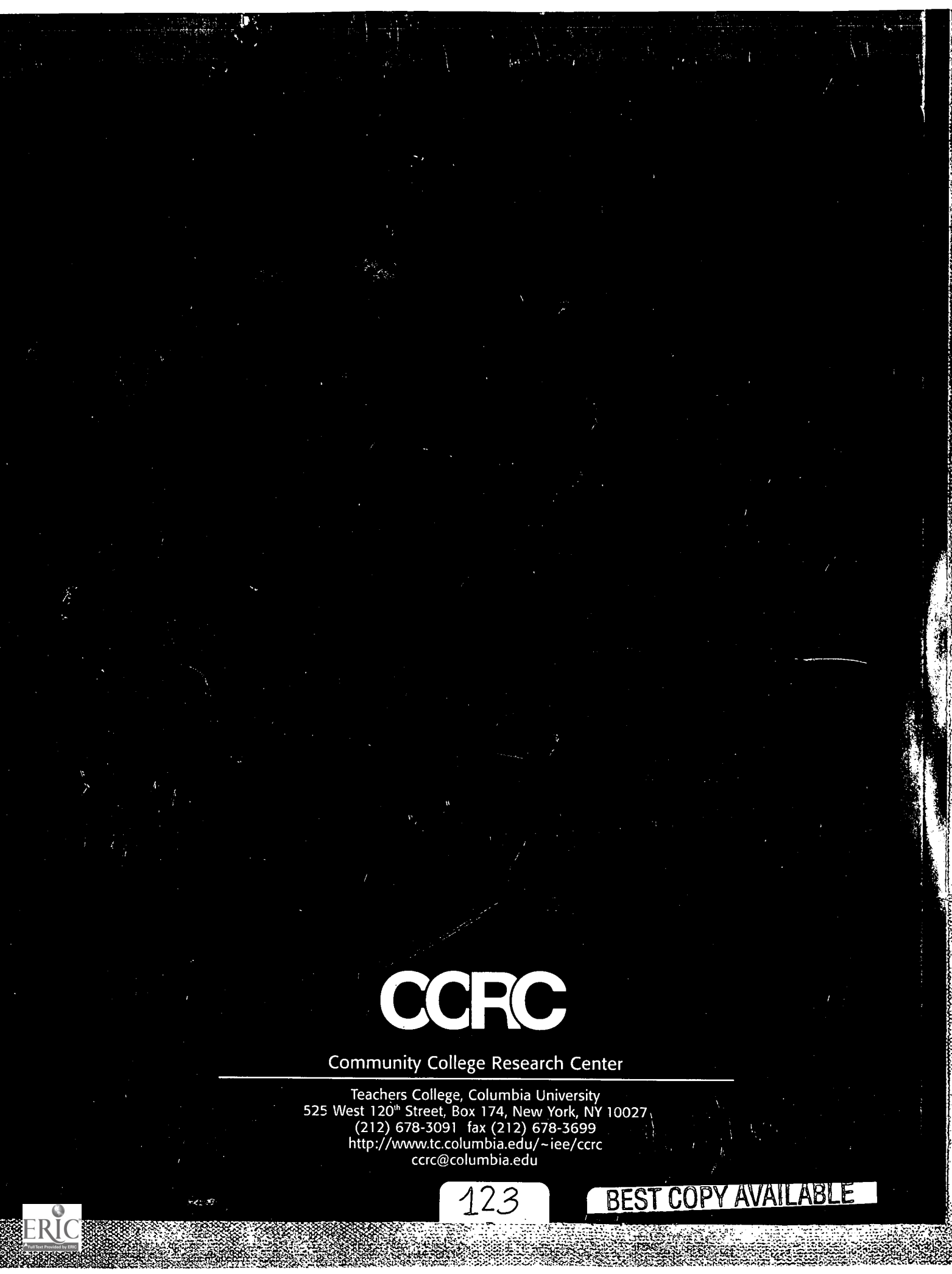
[xxxix] See Workforce Training and Education Coordinating Board (1997, pp. 19-20).

[xl] This is probably not right, though it is difficult to tell from the publication. For example, if an individual earned community college credits in 1990-91, and continued to accumulate both community college credits and credits in four-year college but did not earn a credential by 1994-95, he or she would be counted as an "apple" (not advanced) in 1994-95 despite having accumulated more education. Similarly, high school graduates who entered four-year colleges and earned credits but did not complete baccalaureate degrees would be counted as high school graduates in both years.

[xli] In a study cited at length in Pincus (1980), Sheldon (1982) found that "job seekers" with unclear goals fared worse in the labor market than did "job upgraders" with clear purposes.

[xlii] Surette (1997) found a significant negative effect of the local employment rate on wages, in both OLS and discrete factor estimates; because his data is longitudinal, the effects of unemployment combine both cyclical and cross-sectional effects. However, he did not examine whether unemployment affects the returns to education.

[xliii] For example, although the average return across all labor markets was .049 (using a continuous measure of education), it was less than .034 in 35 of his 144 regions and greater than .080 in 15 of them. Hanushek did not determine what causes such variation, except for finding higher returns in urban than in rural areas. To be sure, such differentials may be temporary since the migration of well-educated workers from low-return regions to high-return regions should eliminate any differentials.



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